

No. 5 — *The Genus Tetragnatha (Araneae, Argiopidae) in
Panama*

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As a result of several visits to the Canal Zone and the Republic of Panama for the purpose of collecting and studying spiders I have accumulated a rather large number of specimens belonging to the interesting genus *Tetragnatha* Latreille, 1804. The present study of the genus is specifically concerned with its occurrence in Panama where it appears to have found exceptionally favorable conditions.

Araneologists who have interested themselves in the genus *Tetragnatha* have emphasized such characters as the following: size of the body; shape of the abdomen; relative position of the eyes; several features of the chelicerae and cheliceral teeth; color; relative lengths of the different segments of the male palp; specific characteristics of the male palpal tarsus; presence or absence of spines on legs and their length. F. P. Cambridge (1903) paid close attention to the characters and relationships of the conductor and embolus in male palps. Petrunkevitch (1930) also did this and, in addition, gave careful attention to the appearance of the genital fold in females which are often difficult to place with certainty because of the absence of an epigynum and other marked characteristics. My experience with the genus seems to show that close attention must always be given to the specific shape of the conductor and embolus as well as to their relationships. These features appear to be the least variable among all of those used by taxonomists and, therefore, the most reliable for purposes of accurate determination. In females the characters of the genital fold are often very helpful. Size; color; number, relative size, and placement of the cheliceral teeth are all subject to a rather wide range of variation. These facts seem to explain the numerous errors in identification which can be found in almost every collection. In making this study I have tried to take into consideration all of these items in making my identifications and in drawing conclusions regarding synonymy.

Acknowledgments are again due and gratefully extended to the

following persons for their interest and coöperation: Dr. A. S. Romer, Director, and Dr. P. J. Darlington, Jr., Curator of Insects, respectively, in the Museum of Comparative Zoology at Harvard College where much of the work of preparing this paper was carried out; Dr. W. J. Gertsch, American Museum of Natural History, for the loan of specimens from Panama; Dr. G. Owen Evans, Department of Zoology, British Museum (Natural History), for the loan of almost indispensable specimens studied by the two Cambridges; Dr. R. V. Chamberlin, University of Utah, for the loan of types from Panama. It is also a pleasure again to acknowledge my indebtedness to the donors of the Penrose Fund of the American Philosophical Society, the Society of Sigma Xi, and the Trustees of the Horace H. and Mary A. Rackham Fund whose grants have made possible six extended periods of collecting and study of spiders in various parts of Panama during the past thirty years.

Genus TETRAGNATHA Latreille, 1804

The Cambridges (1889-1903) reported the following species of this genus in Panama: *T. alba* F. P. Cambridge; *T. pallida* O. P. Cambridge; *T. tenuis* O. P. Cambridge; *T. tenuissima* O. P. Cambridge. Petrunkevitch (1925) added *T. antillana* Simon to the known list from Panama, and Banks (1929) recorded *T. mexicana* Keyserling. Chamberlin and Ivie (1936) described four new species from my first collection of Panamanian spiders made in 1928.

T. alba F. P. Cambridge has proven to be a synonym for *T. laboriosa* Hentz. *T. amplidens* Chamberlin and Ivie and *T. siduo* Chamberlin and Ivie are synonyms for *T. tropica* O. P. Cambridge. The male of *T. apheles* Chamberlin and Ivie belongs with *T. mexicana* Keyserling but the female is a *T. antillana* Simon. *T. ethodon* Chamberlin and Ivie appears to be a valid species. To the best of my knowledge, therefore, the total list of known species of *Tetragnatha* from Panama prior to this study may be stated as follows: *T. antillana* Simon; *T. ethodon* Chamberlin and Ivie; *T. laboriosa* Hentz; *T. mexicana* Keyserling; *T. pallida* O. P. Cambridge; *T. tenuis* O. P. Cambridge; *T. tenuissima* O. P. Cambridge; *T. tropica* O. P. Cambridge.

As a result of my studies on this genus I have definitely recorded the following additional known species to the list: *T. caudata* Emerton; *T. cognata* O. P. Cambridge; *T. confraterna* Banks; *T. guatemalensis* O. P. Cambridge; *T. pallescens* F. P. Cambridge; *T. vermiformis* Emerton. In addition to these I have been compelled to recognize and describe *T. fragilis* sp. nov.; *T. gertschi* sp. nov.; *T. mabelae* sp. nov.; *T. sinuosa* sp. nov. Thus the total number of species of *Tetragnatha* now known to occur in Panama amounts to eighteen.

No attempt is made in this paper to give complete bibliographic references. Only those which are regarded as particularly pertinent are included. Those who desire more extensive bibliographies are referred to Roewer (1942).

Types will be deposited in the Museum of Comparative Zoology at Harvard College.

Key to the Species of Tetragnatha in Panama

Males

1. ALE distinctly further from PLE than AME are from PME (*caudata*, *fragilis*, *mexicana*, *pallescens*, *vermiformis*)2
1. ALE not distinctly further from PLE than AME are from PME (*antillana*, *cognata*, *confraterna*, *ethodon*, *gertschi*, *guatemalensis*, *laboriosa*, *mabelae*, *pallida*, *sinuosa*, *tenuis*, *tenuissima*, *tropica*)..6
2. With abdomen considerably extended posterior to spinnerets.....
.....*T. caudata*, p. 308
2. With abdomen not extended any appreciable distance posterior to spinnerets3
3. With palpal tibia distinctly longer than palpal patella (*mexicana*, *pallescens*)4
3. With palpal tibia not much longer than palpal patella (*fragilis*, *vermiformis*)5
4. Promargin of fang groove with the "large tooth"¹ well developed
.....*T. pallescens*, p. 336
4. Promargin of fang groove without any "large tooth"
.....*T. mexicana*, p. 333
5. A smaller species (about 5-7 mm.); paracymbium distinctly bifid distally; with no spines on legs*T. fragilis*, p. 317

¹The term "large tooth" is being used in the sense in which F. P. Cambridge employed it. In certain species there is an enlarged promarginal tooth at about the "apical third or fourth."

5. A larger species (7-9 mm.); paracymbium not bifid distally; legs with spines *T. vermiformis*, p. 349
6. With no spines on legs; only a fine coating of hair. *T. tenuissima*, p. 344
6. With spines on all legs as well as a supply of hair (*antillana*, *cognata*, *confraterna*, *ethodon*, *gertschi*, *guatemalensis*, *laboriosa*, *mabelae*, *pallida*, *sinuosa*, *tenuis*, *tropica*) 7
7. With palpal tibia much longer than palpal patella (*antillana*, *guatemalensis*, *pallida*, *tenuis*, *tropica*) 8
7. With palpal tibia not much longer than palpal patella (*cognata*, *confraterna*, *ethodon*, *gertschi*, *laboriosa*, *mabelae*, *sinuosa*) 12
8. Paracymbium bifid distally *T. antillana*, p. 306
8. Paracymbium not bifid distally (*guatemalensis*, *pallida*, *tenuis*, *tropica*) 9
9. Paracymbium extended distally into a vermiform termination *T. guatemalensis*, p. 326
9. Paracymbium not distally vermiform (*pallida*, *tenuis*, *tropica*) 10
10. The "large tooth" proper well developed (see note, p. 303) *T. tropica*, p. 347
10. The "large tooth" proper not present (*pallida*, *tenuis*) 11
11. The conductor, embolus, and cymbium all long, slender, nearly straight (Fig. 78) *T. pallida*, p. 338
11. The conductor, embolus, and cymbium all at least somewhat sinuous (See F. P. Cambridge's Figs. 1 and 1A, Plate 41) .. *T. tenuis*, p. 342
12. With abdomen extended a short distance posterior to spinnerets. *T. confraterna*, p. 312
12. With abdomen not extended posterior to spinnerets (*cognata*, *ethodon*, *gertschi*, *laboriosa*, *mabelae*, *sinuosa*) 13
13. The promargiu of fang groove with a very large, massive tooth at base of fang (Fig. 85) *T. sinuosa*, p. 340
13. The promargin of fang groove without any very large, massive tooth at base of fang (*cognata*, *ethodon*, *gertschi*, *laboriosa*, *mabelae*) . . 14
14. With the paracymbium somewhat serrated distally (Fig. 64) *T. mabelae*, p. 330
14. With paracymbium not serrated distally (*cognata*, *ethodon*, *gertschi*, *laboriosa*) 15
15. Bulb of palpal tarsus distinctly inflated (Fig. 39) *T. gertschi*, p. 321
15. Bulb of palpal tarsus not unusually inflated (*cognata*, *ethodon*, *laboriosa*) 16
16. Paracymbium distinctly notched distally *T. ethodon*, p. 316
16. Paracymbium without distal notch (*cognata*, *laboriosa*) 17

17. Conductor with a cap-like distal termination (Fig. 56)
 *T. laboriosa*, p. 329
17. Conductor without a cap-like distal termination; with a bluntly rounded
 termination *T. cognata*, p. 310

Females

Because of the lack of distinctive features in females it is difficult to provide readily workable keys. It is hoped, however, that the following key will aid the student of the group in separating the females of the different species.

1. ALE distinctly further from PLE than AME are from PME (*caudata*,
fragilis, *mexicana*, *pallescens*, *vermiformis*) 2
1. ALE not distinctly further from PLE than AME are from PME
 (*antillana*, *cognata*, *confraterna*, *gertschi*, *guatemalensis*, *laboriosa*,
pallida, *tenuis*, *tenuissima*, *tropica*) 6
2. Abdomen considerably extended posterior to spinnerets
 *T. caudata*, p. 308
2. Abdomen not noticeably extended posterior to spinnerets (*fragilis*,
mexicana, *pallescens*, *vermiformis*) 3
3. Spines completely lacking from all legs *T. fragilis*, p. 317
3. Spines present on all legs (*mexicana*, *pallescens*, *vermiformis*) 4
4. Genital fold considerably longer than wide ... *T. vermiformis*, p. 349
4. Genital fold wider than long (*mexicana*, *pallescens*) 5
5. Genital fold very gently procurved (Fig. 70) *T. mexicana*, p. 333
5. Genital fold strongly procurved, fully twice as wide as long (Fig. 75)
 *T. pallescens*, p. 336
6. Spines completely lacking from all legs *T. tenuissima*, p. 344
6. Spines present on all legs (*antillana*, *cognata*, *confraterna*, *gertschi*,
guatemalensis, *laboriosa*, *pallida*, *tenuis*, *tropica*) 7
7. Retromargin of fang groove with a much enlarged tooth at base of fang
 directed forward (Fig. 6) *T. antillana*, p. 306
7. Retromargin of fang groove without a greatly enlarged tooth at base
 of fang directed forward (*cognata*, *confraterna*, *gertschi*, *guate-*
malensis, *laboriosa*, *pallida*, *tenuis*, *tropica*) 8
8. Genital fold fully twice as long as wide (Fig. 26)
 *T. confraterna*, p. 312
8. Genital fold much less than twice as long as wide (*cognata*, *gertschi*,
guatemalensis, *laboriosa*, *pallida*, *tenuis*, *tropica*) 9
9. Basal segment of chelicera nearly as long as carapace; basal segment
 of chelicera with an unusual dorsal blunt tooth near base of fang
 (Fig. 100) *T. tropica*, p. 347

9. Basal segment of chelicera much shorter than carapace; basal segment of chelicera without any dorsal distal tooth near base of fang (*cognata*, *gertschi*, *guatemalensis*, *laboriosa*, *pallida*, *tenuis*)10
10. ALE definitely closer to PLE than AME are to PME (*cognata*, *gertschi*, *guatemalensis*)11
10. ALE not closer to PLE than AME are to PME (*laboriosa*, *pallida*, *tenuis*)13
11. A larger species, 9-11 mm.; fang with a dorsal basal cusp
*T. guatemalensis*, p. 326
11. Smaller species, from 5-8 mm.; fang without a dorsal basal cusp (*cognata*, *gertschi*)12
12. Abdomen deeply notched at base dorsally*T. cognata*, p. 310
12. Abdomen unnotched at base dorsally*T. gertschi*, p. 321
13. Abdomen conspicuously silvery on dorsal and dorsolateral sides, with a dark median ventral stripe and a silvery stripe on each side of the dark stripe*T. laboriosa*, p. 329
13. Abdomen not conspicuously silvery and without the ventral stripes as in *laboriosa* (*pallida*, *tenuis*)14
14. ALE about as far from PLE as AME are from PME; with long robust leg spines*T. pallida*, p. 338
15. ALE slightly further from PLE than AME are from PME; with relatively weak leg spines*T. tenuis*, p. 342

TETRAGNATHA ANTILLANA Simon, 1897
 (Figures 1-6)

T. antillana Banks, 1901

T. antillana F. P. Cambridge, 1903

T. antillana Petrunkevitch, 1911

T. eremita Chamberlin, 1924

T. antillana Seecley, 1928

T. antillana Petrunkevitch, 1930

T. apheles Chamberlin and Ivie, 1936 (female only)

T. festina Bryant, 1945 (male only)

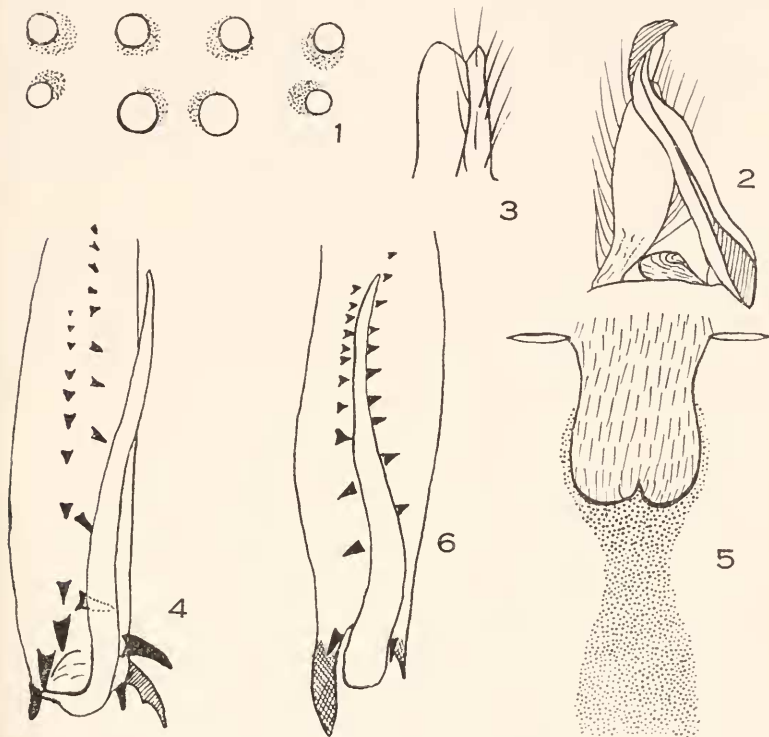
T. haitiensis Bryant, 1945 (females)

T. antillana Kraus, 1955

T. antillana Simon is well known throughout Mexico, Central America, most of South America, and the West Indies. The vial in the collection of the Museum of Comparative Zoology labelled the type of *T. eremita* Chamberlin now contains only a single male palp but this is very definitely from *T. antillana* Simon. The female about which Dr. Chamberlin had some doubts also

clearly belongs here. Moreover, the female of *T. aphcles* Chamberlin and Ivie is quite clearly a *T. antillana* Simon.

Male: Lateral eyes somewhat closer to one another than AME are to PME; legs well supplied with short spines; palpal patella about two-thirds as long as palpal tibia; the conductor and



External Anatomy of *Tetragnatha*

Figures 1-6, *T. antillana*

Fig. 1. Eye group from in front.

Fig. 2. Distal ends of conductor, embolus, and cymbium.

Fig. 3. Distal end of paracymbium.

Fig. 4. Chelicera and teeth of male.

Fig. 5. Genital fold and genital area, female.

Fig. 6. Chelicera and teeth of female.

embolus as shown in Figure 2; the paracymbium is distally bifurcate (Fig. 3); the fang is moderately sinuous and is without a basal dorsal cusp but there is a suppressed tubercle on the inner margin opposite the third promarginal tooth; there is no "large tooth" on the promargin but the spur together with the two contiguous teeth forms a conspicuous group of three (Fig. 4).

Female: The genital fold is as shown in Figure 5; the retro-marginal of the fang groove has a large distinctive tooth directed forward with a small tooth near it (Fig. 6); the promargin has a similar pair of distal but smaller teeth; the fang is moderately sinuous and there may be a suppressed dorsolateral cusp near its base; the abdomen is not extended posterior to the spinnerets in either sex.

Collection records: The male and female hypotypes are from Boquete, R. P., August, 1950 and July, 1939, respectively. Numerous examples of both sexes from Boquete, R. P., July, 1939, August, 1950; El Valle, R. P., July, 1936; El Volcan, R. P., February-April, 1936 (W. J. Gertsch); one female from Madden Dam Forest, C. Z., July, 1950.

TETRAGNATHIA CAUDATA Emerton, 1884
(Figures 7-11)

Eucta lacerta Petrunkevitch, 1911

T. caudata Seeley, 1928

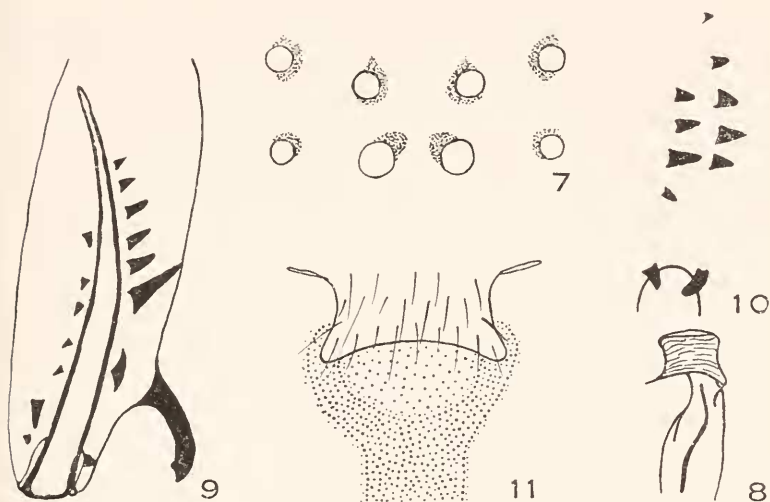
T. caudata Bryant, 1940

T. lacerta Roewer, 1942

T. caudata Kaston, 1948

For some time this species was considered as new and was scheduled to be described as such. After careful comparison with *T. caudata* from the northern regions the close similarities seemed to warrant regarding it as a southern variant of this species. Further knowledge regarding it may compel araneologists to regard it as a separate species. *T. caudata* Emerton has been recorded from Maine to Florida along the Atlantic coast, from Canada, through several middle Western states, and in the south as far west as Mississippi. It is interesting to find it now in Panama and not where it would be expected to come in with goods shipped from the north. The most distinctive features of the species are given below.

Male: ALE considerably further from PLE than AME are from PME (Fig. 7); palpal patella only a little shorter than palpal tibia; the conductor terminates in a broad distal piece (differing considerably from that in northern forms) (Fig. 8); the paracymbium is bluntly rounded distally; the prolateral spur is indistinctly bifid; the "large tooth" is present and the other cheliceral teeth are as shown in Figure 9; the fang has no cusps; the abdomen is considerably extended beyond the spinnerets; leg spines are few and weak.



External Anatomy of *Tetragnatha*

Figures 7-11, *T. caudata*

Fig. 7. Eye group from in front.

Fig. 8. Apex of conductor and embolus of male.

Fig. 9. Male chelicera and cheliceral teeth.

Fig. 10. Female cheliceral teeth from below.

Fig. 11. Genital fold of female.

Female: Cheliceral teeth as shown in Figure 10; the genital fold as shown in Figure 11; abdomen extended posterior to spinnerets for about one-fifth of the total length of the organ; male hypotype 6.05 mm. long; female hypotype 9.36 mm. long.

Collection records: The hypotypes are from Boquete, Chiriqui, R. P., August, 1950. Two other females are in the collection and taken at the same place and time, together with a single female from this locality taken in August, 1954.

TETRAGNATHIA COGNATA O. P. Cambridge, 1889
(Figures 12-18)

T. cognata F. P. Cambridge, 1903

T. cognata Petrunkevitch, 1911

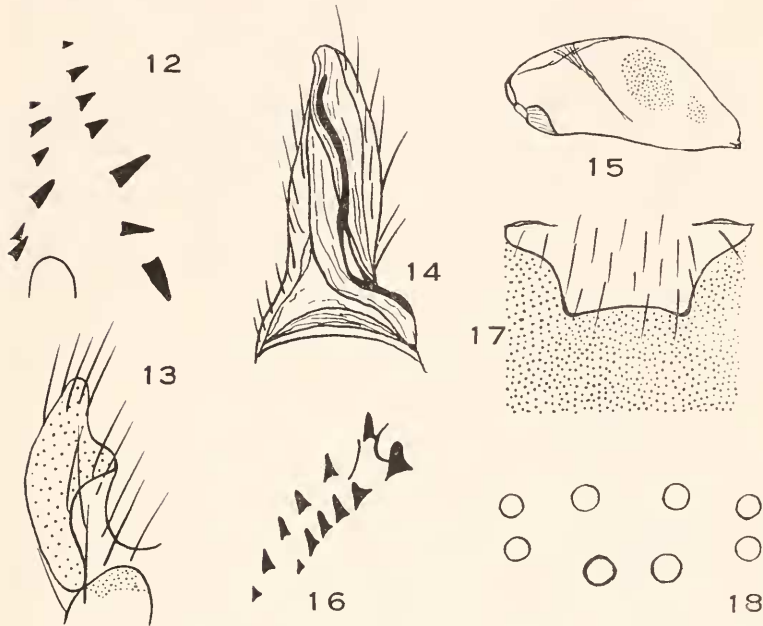
T. cognata Roewer, 1942

Apparently this species has not been studied since the original work done by the Cambridges and, hence, it seems desirable to give a condensed description of hypotypes as follows:

Male hypotype. Total length 4.160 mm. exclusive of chelicerae; including chelicerae 4.875 mm. Abdomen widest about two-fifths from base; does not extend posterior to spinnerets. Legs comparatively robust; with both spines and hairs. Ratio of eyes AME : ALE : PME : PLE = 3.5 : 2.5 : 3.5 : 3.5. Lateral eyes separated from one another by the diameter of ALE. AME separated from PME by nearly twice as far. Carapace longer than basal segment of chelicerae in ratio of about 3 : 2. Chelicerae: relatively short and robust; the fang has a cusp on its inner margin near the base; the prolateral spur is a simple and fairly robust spine; the promargin of the fang groove has six teeth of which the second is considerably enlarged and could well be considered the "large tooth" in the usual sense but F. P. Cambridge did not so regard it; the retromargin has six teeth with the first two close together (Fig. 12). Legs with both spines and hair. Palp: the tibia is only slightly longer than the patella; the paracymbium is relatively short and broad except terminally where it narrows to a blunt apex (Fig. 13); the conductor is broad throughout its length (Fig. 14). The hypotype male is colored essentially like the hypotype female but is lighter throughout.

Hypotype female. Total length exclusive of the chelicerae 5.265 mm.; inclusive of the chelicerae 5.525 mm. Abdomen very gibbous about the middle (Fig. 15); gibbosity lacking in some individuals which may not be mature; not continued posterior to spinnerets. Chelicerae: short, robust; fang without inner or

outer cusps; promargin of fang groove with seven teeth¹; retro-margin with six (Fig. 16). Some variation in respect to number and placement of teeth has been noted in both sexes. When the female is fully mature the genital fold appears as shown in Figure 17. The eyes are essentially as they appear in the male (Fig. 18).



External Anatomy of *Tetragnatha*

Figures 12-18, *T. cognata*

Fig. 12. Left male cheliceral teeth.

Fig. 13. Male paracymbium.

Fig. 14. Male conductor, embolus, and distal end of cymbium.

Fig. 15. Lateral view of female abdomen.

Fig. 16. Left female cheliceral teeth. (See footnote)

Fig. 17. Genital fold of female.

Fig. 18. Eye group of female from in front.

¹ In Figure 16 there should be an additional minute tooth a short distance proximal to the sixth tooth on the promargin (upper side).

Collection records: The hypotypes are from Boquete, Chiriqui, R. P., August, 1954. Numerous examples of both sexes from Boquete, R. P., July, 1939, August, 1950, 1954; El Volcan, Chiriqui, R. P., August, 1950; Canal Zone Experiment Gardens, C. Z., August, 1954; Summit, C. Z., August, 1950.

TETRAGNATHA CONFRATERNA Banks, 1909
(Figures 19-26)

T. confraterna Petrunkevitch, 1911

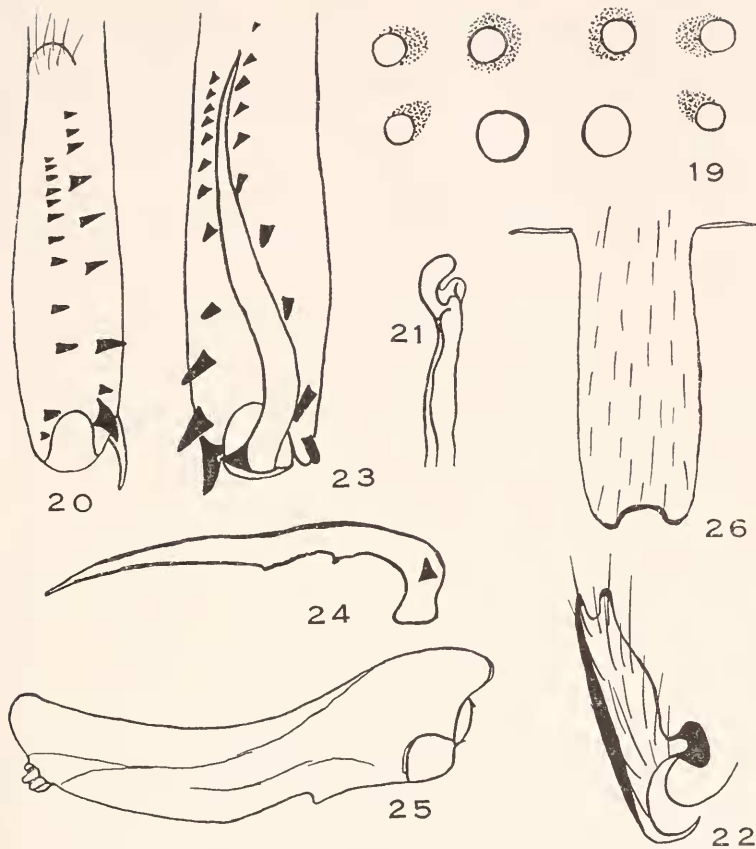
T. confraterna, Roewer, 1942

This species was described by its author from Costa Rica with great brevity and accompanied by a very simple figure of the male chelicera. The species has received no attention since 1909 and would seem to deserve a detailed description which is given below in accord with my usual formula.

Male hypotype. Total length exclusive of the chelicerae 8.775 mm.; inclusive of the chelicerae about 10.92 mm. Carapace 3.12 mm. long, 1.722 mm. wide opposite posterior border of second coxae where it is widest; cephalic part only slightly raised; with other features as usual in the genus.

Eyes. Ocular tubercle bearing AME rather prominent; viewed from above, both rows moderately recurved; viewed from in front, anterior row slightly recurved, posterior row nearly straight, both measured by centers; central ocular quadrangle wider behind than in front in ratio of 6 : 5, wider behind than long in ratio of 6 : 5. Ratio of eyes AME : ALE : PME : PLE = 6 : 3 : 4.25 : 4. AME separated from one another by slightly more than their diameter, from ALE by slightly more than 1.3 times their diameter. PME separated from one another by slightly less than 2.5 times their diameter, from PLE by twice their diameter. Laterals separated from one another by the diameter of AME. AME separated from PME by slightly more than the distance between the laterals (Fig. 19). Height of clypeus equal to 1.5 times the diameter of AME.

Chelicerae. Strongly developed, quite correct, and moderately divergent; basal segment 2.73 mm. long and, therefore, somewhat shorter than carapace; fang long, slender, only slightly sinuous, without cusps; the prolateral spur is simple, without

External Anatomy of *Tetragnatha*Figures 19-26, *T. confraterna*

- Fig. 19. Eye group of male from in front.
 Fig. 20. Left chelicera and cheliceral teeth of male.
 Fig. 21. Distal end of male conductor and embolus.
 Fig. 22. Paracymbium of male.
 Fig. 23. Left chelicera and cheliceral teeth of female.
 Fig. 24. Fang of female.
 Fig. 25. Lateral side of female abdomen.
 Fig. 26. Genital fold of female.

bifurcation or a tooth; the promargin of the fang groove bears nine teeth with the first robust and the second small; the retro-marginal has twelve teeth; the teeth are spaced essentially as shown in Figure 20. There is no "large tooth" on the promargin of the fang groove.

Maxillae. Longer than lip in ratio of 45 : 19. Otherwise essentially as usual in the genus.

Lip. Nearly as long as wide at base. Sternal suture gently procurved; with sternal tubercles as usual at ends of sternal suture.

Sternum. Longer than wide in ratio of about 4 : 3; posterior coxae separated by slightly more than one-third of their width. Otherwise essentially as usual in the genus.

Legs. 1243. Width of first patella at "knee" .330 mm., tibial index of first leg 4. Width of fourth patella at "knee" .308 mm., tibial index of fourth leg 6.

	Femora	Patellae	Tibiae	Metatarsi	Tarsi	Totals
	(All measurements in millimeters)					
1.	7.865	1.175	8.060	8.710	1.755	27.565
2.	5.590	.975	4.745	4.875	1.150	17.355
3.	2.600	.552	1.625	2.080	.645	7.502
4.	6.045	.715	4.485	4.810	.950	17.005
Palp	1.826	.660	.704	—	1.144	4.334

Legs are provided with both spines and hairs.

Palp. Tibia only slightly longer than patella; the paracymbium is notched distally with the chitinous knob somewhat closer to the base than to the apex; the conductor is rather slender and terminates characteristically at its distal end (Figs. 21-22).

Abdomen. Definitely extended a short distance posterior to spinnerets; only slightly enlarged near base; without any dorsal basal notch; only overlaps carapace slightly; 6.305 mm. long.

Color in alcohol. Legs and chelicerae yellowish with some irregular grayish markings at joints. Maxillae yellowish along median borders, grayish elsewhere. Lip and sternum grayish. Carapace with a broad dusky gray median stripe and grayish bands radiating from the median pit; also with a broad dusky stripe along the border. Abdomen: the dorsum is light colored with many yellowish silvery spangles and dusky areas; lateral

sides with narrow, irregular, grayish lines; venter light yellowish.

Female hypotype. Total length exclusive of the chelicerae 13 mm.; including the chelicerae 15.60 mm. Carapace 3.055 mm. long, 2.21 mm. wide opposite second coxae where it is widest.

Eyes. Essentially as in male.

Chelicerae. Basal segment 2.925 mm. long and, therefore, slightly shorter than carapace; fang robust, markedly sinuous and with a robust dorsolateral cusp near base and a smaller inner cusp about one-fourth from base; promargin of fang groove with ten teeth; retromargin with twelve teeth the first of which is the largest (Figs. 23-24); all spaced essentially as shown in figures.

Maxillae, Lip, and Sternum. All essentially as in male.

Legs. 1243. Width of first patella at "knee" .525 mm., tibial index of first leg 5. Width of fourth patella at "knee" .352 mm., tibial index of fourth leg 6.

	Femora	Patellae	Tibiae	Metatarsi	Tarsi	Totals
	(All measurements in millimeters)					
1.	8.645	1.430	8.840	9.750	1.950	30.615
2.	5.785	1.170	5.200	5.700	1.235	19.110
3.	3.055	.660	1.820	2.405	.780	8.720
4.	6.370	.910	5.005	5.070	.810	18.165

All legs with spines and hair as in male.

Abdomen. Definitely extends a short distance posterior to spinnerets; considerably swollen in anterior third and quite concave dorsally (concavity varies considerably among available specimens) (Fig. 25); slightly notched at base above; 10.075 mm. long; genital fold essentially as shown in Figure 26 but lateral margins indistinct.

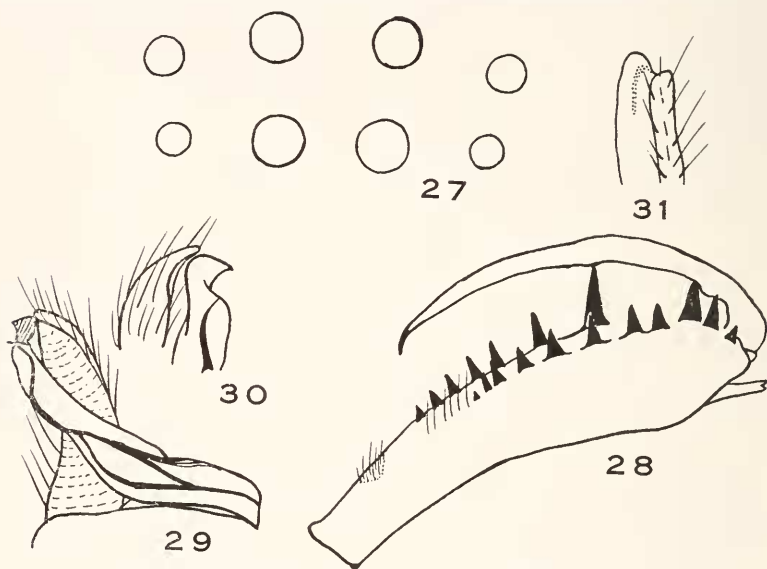
Color in alcohol. Essentially as in male but in general is considerably lighter with dark abdominal markings practically absent.

Type locality. Both hypotypes from Barro Colorado Island, C. Z., June, 1939. Numerous examples of both sexes from Barro Colorado Island, June, 1934; February, 1936 (W. J. Gertsch); June, 1936; June and August, 1939; July, 1950.

TETRAGNATHA ETHODON Chamberlin and Ivie, 1936
(Figures 27-31)

T. ethodon Roewer, 1942

As I have pointed out elsewhere, the females regarded by the authors of this species as the allotype and paratypes actually belong to *T. tenuissima* O. P. Cambridge. The absence of spines on the legs, the cheliceral teeth, and the genital fold as well as other less marked characteristics make this identification certain.



External Anatomy of *Tetragnatha*

Figures 27-31, *T. ethodon*

Fig. 27. Eye group of male from in front.

Fig. 28. Left male chelicera and cheliceral teeth from below.

Fig. 29-30. Two views of distal parts of male conductor, embolus, and cymbium.

Fig. 31. Distal end of male paracymbium.

The holotype male appears to represent a valid species and is so regarded in this paper. It seems strange, however, that only one specimen has been taken in view of the repeated extensive

collecting practiced during the past twenty-eight years. The male holotype is rather badly mutilated and, hence, it is impossible to describe it as carefully as desired. The following items may be useful additions to the very brief description given by the authors of the species.

Eyes. Viewed from above, both rows moderately recurved; viewed from in front, anterior row nearly straight and posterior row gently procurved, both measured by centers. Central ocular quadrangle slightly wider behind than in front, slightly wider behind than long. Ratio of eyes AME : ALE : PME : PLE = 12 : 8 : 10 : 9. AME separated from one another by their diameter, from ALE by about five-fourths of their diameter. PME separated from one another by about 1.7 times their diameter, from PLE by slightly less than this. Laterals separated from one another by five-fourths of the diameter of ALE. Laterals, therefore, slightly closer to one another than AME are to PME. Height of clypeus equal to about five-fourths of the diameter of AME.

Chelicerae. The "large tooth" is present; the pro lateral spur is bifid; the cheliceral teeth along the fang groove are as shown in Figure 28.

Palp. Essentially as shown in figures provided by the authors of the species; some details relating to conductor, embolus, and paracymbium are shown in Figures 29-31.

Type locality. The holotype is from Barro Colorado Island, C. Z., July-August, 1928 (Chickering). No other specimens have come to light during several collecting periods since the finding of the holotype.

TETRAGNATHA FRAGILIS sp. nov.

(Figures 32-38)

Male holotype. Total length including chelicerae 5.85 mm., exclusive of the chelicerae 5.395 mm. Carapace 1.527 mm. long, .780 mm. wide opposite second coxae where it is widest; cephalic part nearly parallel sided; other features as usual in the genus.

Eyes. Eight in two rows as usual, all dark; viewed from above, both rows definitely recurved; viewed from in front, both rows also moderately recurved, measured by centers. Central ocular quadrangle wider behind than in front in ratio of 13 : 11; wider

behind than long in nearly the same ratio. Ratio of eyes AME : ALE : PME : PLE = 7.5 : 5 : 6.5 : 6. AME separated from one another by about six-fifths of their diameter, from ALE by four-thirds of their diameter. PME separated from one another by slightly more than twice their diameter, from PLE by a little more than 1.5 times their diameter. Laterals separated from one another by a little more than twice the diameter of PLE. AME separated from PME by slightly more than 1.5 times the diameter of PME and, therefore, closer together than ALE are to PLE. Height of clypeus equal to about the diameter of AME.

Chelicerae. Well developed; strongly divergent; basal segment .910 mm. long; with a well-developed prolateral spur having a pair of blunt terminal tubercles; fang only slightly sinuous but conspicuously bowed near the middle; the promargin of the fang groove has the "large tooth" about one-third from the distal end, a small tooth distal to this and a series of five teeth proximal to it diminishing in size to very minute at the last (this series appears to be very variable among the paratypes); the retromargin has a relatively large hook-like tooth near the base of the fang and a series of five additional more proximal (only four of these on the right) (Figs. 32-33); paratypes frequently show only three proximal to the hook-like tooth on the retromargin.

Maxillae. Nearly parallel, somewhat broadened distally; somewhat concave along lateral surface in distal quarter; longer than lip in ratio of 23 : 10; somewhat more than three times as long as wide at narrowest level.

Lip. Longer than wide at base in ratio of about 9 : 8; sternal suture gently procurved; with the usual sternal tubercles at ends of sternal suture.

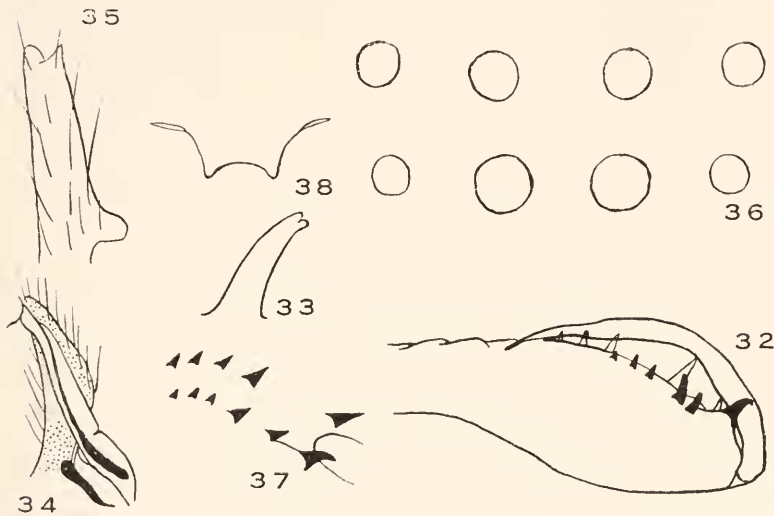
Sternum. Generally scutiform; moderately convex; longer than wide in ratio of about 37 : 25; moderately scalloped opposite each coxa and extended between all coxae, the second and third being relatively widely separated; continued as a narrow sclerite between fourth coxae which are separated by only one-eleventh of their width.

Legs. 1243. Width of first patella at "knee" .198 mm., tibial index of first leg 4. Width of fourth patella at "knee" .137 mm., tibial index of fourth leg 5.

	Femora	Patellae	Tibiae	Metatarsi	Tarsi	Totals
	(All measurements in millimeters)					
1.	4.745	.585	5.085	5.525	1.397	17.337
2.	3.120	.390	2.730	2.925	.900	10.065
3.	1.625	.242	.902	1.170	.520	4.459
4.	3.575	.292	2.275	2.470	.748	9.360
Palp	.748	.225	.264	—	.590	1.827

True spines are completely lacking from all legs.

Palp. The tibia is slightly longer than patella but both are short; the paracymbium is distinctly notched or bifid at its apex; the embolus describes nearly a circle on the bulb and then extends nearly straight to terminate at a point slightly beyond



External Anatomy of *Tetragnatha*

Figures 32-38, *T. fragilis*

Fig. 32. Left chelicera and cheliceral teeth of male from below.

Fig. 33. Prolatateral spur of male.

Fig. 34. Distal parts of male cymbium, embolus, and conductor.

Fig. 35. Paracymbium of male.

Fig. 36. Eye group of female from in front.

Fig. 37. Cheliceral teeth of female.

Fig. 38. Genital fold of female.

the tip of the conductor which has a very characteristic form (Figs. 34-35). Both conductor and embolus are closely associated throughout.

Abdomen. Not continued posterior to spinnerets; only slightly extended over carapace; 3.802 mm. long; without any anterior dorsal notch at base; very slender and of nearly uniform diameter throughout; a little more than seven times as long as wide near base; genital fold only a transverse ridge.

Color in alcohol. Legs yellowish with extensive fine dusky gray dotting. Palps, chelicerae, and maxillae yellow with a variety of shading. Lip and sternum yellowish with dusky dotting. Carapace yellowish with a broad irregular dusky median stripe from posterior border nearly to PLE. Abdomen: dorsum yellowish white with a small median black spot just above the anal tubercle and four pairs of similar small black dorsolateral spots in the posterior three fourths (with some irregularities); there is a narrow dark gray lateral stripe on each side; the venter is a dusky gray.

Female allotype. Total length including chelicerae 7.67 mm. Carapace 1.82 mm. long, 1.25 mm. wide opposite second coxae where it is widest; otherwise essentially as in male.

Eyes. Essentially as in male (Fig. 36).

Chelicerae. Moderately robust; moderately divergent; scarcely porrect; basal segment .845 mm. long; fang without particularly conspicuous features; promargin of fang groove with a moderately large tooth near distal end and, after a long space, a series of four teeth diminishing in size toward the proximal end; retromargin with six teeth arranged and spaced essentially as shown in Figure 37. As usual there are variations in number and placement of cheliceral teeth among the paratypes; one paratype exhibits the same number and placement on the promargin but has seven teeth on the retromargin spaced somewhat differently also from those of the allotype.

Maxillae, Lip, and Sternum. Except for minor details, essentially as in male.

Legs. 12-43. Width of first patella at "knee" .220 mm., tibial index of first leg 4. Width of fourth patella at "knee" .154 mm., tibial index of fourth leg 5.

	Femora	Patellae	Tibiae	Metatarsi	Tarsi	Totals
	(All measurements in millimeters)					
1.	5.200	.660	5.265	5.265	1.300	17.690
2.	3.250	.520	2.795	2.860	.780	10.205
3.	1.820	.292	.910	1.170	.560	4.752
4.	3.510	.455	2.860	2.600	.780	10.205

Legs without true spines as in male.

Abdomen. Long and slender as in male; 5.58 mm. long; genital fold as shown in Figure 38.

Color in alcohol. Essentially as in male except that dusky areas are much less conspicuous; the single median dorsal spot just above anal tubercle as in male but the paired dorsolateral spots are only faintly indicated; the dorsal and dorsolateral areas are covered by many yellowish silvery spangles.

Type locality. Male holotype and female allotype from Barro Colorado Island, C. Z., August, 1936. Numerous paratypes of both sexes from Barro Colorado Island: June-August, 1936. July, 1950; July, 1954; Ft. Davis, C. Z., August, 1936; Balboa, C. Z., August, 1936; Pedro Miguel, C. Z., July, 1950; Madden Dam Forest, C. Z., August, 1939; C. Z. Forest Reserve, July-August, 1939 and July, 1950; Gamboa, C. Z., July, 1954; Summit, C. Z., July-August, 1950; C. Z. Experiment Gardens, C. Z., July-August, 1954. Arraijan, R. P., August, 1936; Porto Bello, R. P., August, 1936.

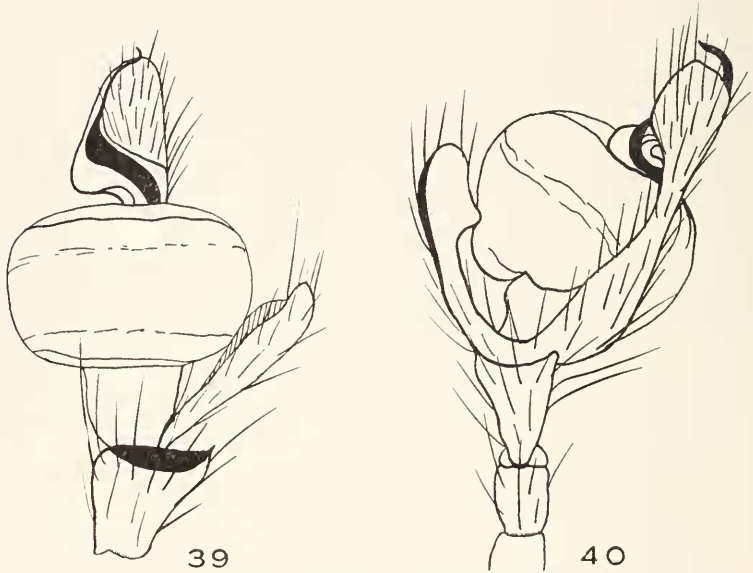
TETRAGNATHA GERTSCHI, sp. nov.

(Figures 39-45)

Male holotype. Total length including chelicerae 5.395 mm. Carapace 2.015 mm. long; 1.365 mm. wide opposite second coxae where it is widest; with the usual form of the genus; .390 mm. tall and, therefore, about .29 as tall as wide; with cephalic region somewhat raised; with the usual shallow median pit with apex directed forward.

Eyes. Eight in two rows, all dark; ocular tubercle bearing LE quite prominent; viewed from above, both rows moderately recurved; viewed from in front, anterior row gently recurved and posterior row gently procurved, both measured by centers; central ocular quadrangle wider behind than in front in ratio of 4 : 3, wider behind than long in ratio of 6 : 5. Ratio of eyes

AME : ALE : PME : PLE = 4 : 3.25 : 4.75 : 4. AME separated from one another by seven-fourths of their diameter, from ALE by eleven-fourths of their diameter. PME separated from one another by nearly twice their diameter, from PLE by nearly the same distance. Laterals separated from one another by about two-thirds of the diameter of ALE and, therefore, much closer to one another than AME are to PME. Height of clypeus nearly equal to the diameter of AME.



External Anatomy of *Tetragnatha*

Figures 39-40, *T. gertschi*

Fig. 39. Male palpal tibia and tarsus; showing dilated bulb and course of embolus and conductor.

Fig. 40. Male palpal patella, tibia, and tarsus; showing features of cymbium and paracymbium.

Chelicerae. Well developed and moderately divergent in distal halves; basal segment 1.20 mm. long; with a well developed pro-lateral bluntly pointed spur on each; fang regularly curved,

not sinuous; fang groove well marked; promargin of fang groove with seven teeth, retromargin with seven and with both sets spaced essentially as shown in Figure 42. There is no so-called "large tooth" on the promargin and the two most distal retro-marginal teeth are close together. Some variation in number and placement of teeth has been noted among the paratypes.

Maxillae. Nearly parallel in general but slightly divergent in distal halves; with rounded distal truncatures; slightly concave along lateral surfaces; longer than lip in ratio of about 32 : 15; about three times as long as wide at narrowest level.

Lip. Broader at base than long in ratio of about 4 : 3; sternal suture gently procurved; with pronounced sternal tubercles at ends of suture.

Sternum. Generally scutiform; moderately convex; longer than wide in ratio of about 5 : 4; moderately scalloped opposite each coxa and produced between all coxae; continued as a narrow sclerite between fourth coxae which are separated by slightly more than one-third of their width.

Legs. 1243. Width of first patella at "knee" .264 mm., tibial index of first leg 5. Width of fourth patella at "knee" .198 mm., tibial index of fourth leg 7.

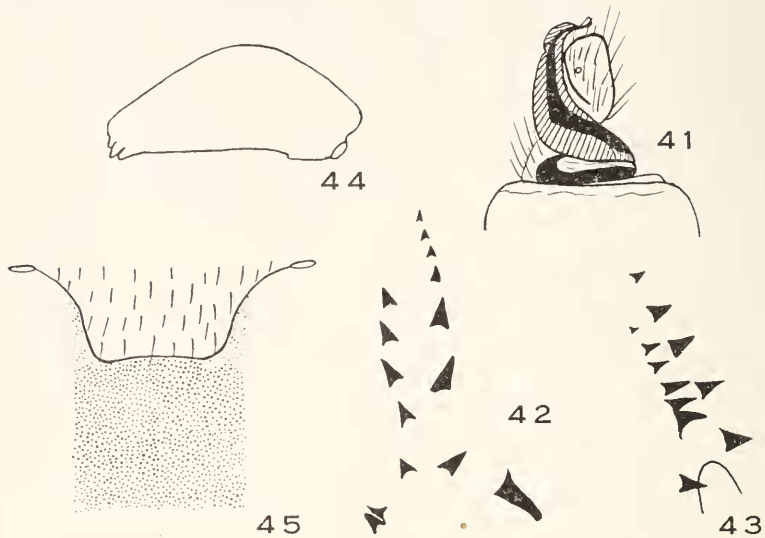
	Femora	Patellae	Tibiae	Metatarsi	Tarsi	Totals
	(All measurements in millimeters)					
1.	4.615	.910	4.205	4.745	1.170	15.695
2.	2.990	.715	2.470	2.665	.748	9.588
3.	1.365	.500	.910	1.040	.520	4.335
4.	2.795	.585	2.145	2.340	.585	8.450
Palp	.943	.325	.286	—	1.040	2.594

All legs with spines and hair. Trichobothria have been observed on all femora.

Palp. The patella is slightly longer than the tibia which has the usual distal chitinized rim. The cymbium is long, slender, constricted in the middle third, and much broader at base. The paracymbium is also slender, club-shaped, with a long chitinized border together with a chitinized knob essentially as shown in Figures 39-40. Both conductor and embolus are somewhat spiraloid, closely associated throughout their length, and with the tips extended as a terminal hook (Fig. 41). The bulb is more inflated than usual in the genus.

Abdomen. Not continued posterior to spinnerets; extended slightly over the carapace; 3.445 mm. long; slightly notched dorsally at base; about 1.235 mm. wide at widest place and, therefore, a little less than three times as long as wide; genital fold essentially as in female.

Color in alcohol. Legs and palps with varying shades of yellowish. Chelicerae brownish. Carapace yellowish with irregular inter-communicating grayish lines; just in front of



External Anatomy of *Tetragnatha*

Figures 41-45, *T. gertschi*

- Fig. 41. Distal end of male palpal tarsus.
 Figs. 42-43. Male and female cheliceral teeth, respectively.
 Fig. 44. Lateral view of female abdomen.
 Fig. 45. Genital fold of female.

thoracic pit there is a small gray elongated spot. Sternum, lip, and maxillae are brownish with fine gray dots. Abdomen: dorsum yellowish with numerous small subchitinous irregular silvery flecks; lateral sides irregularly black with larger silvery

spots; venter with a central grayish stripe and a yellowish stripe on each side with numerous silvery flecks.

Female allotype. Total length including chelicerae 5.525 mm. Carapace 1.625 mm. long; 1.235 mm. wide opposite second coxae where it is widest; otherwise essentially as in male.

Eyes. Essentially as in male.

Chelicerae. Moderately robust; moderately divergent; basal segment .845 mm. long. Fang without conspicuous features. Fang groove well marked; with five promarginal teeth and seven retromarginal teeth, spaced as shown in Figure 43.

Maxillae. Essentially parallel; broadened distally and less rounded there than in males. Otherwise essentially as in male.

Lip. Broader at base than long in ratio of 19 : 13. Otherwise essentially as in male.

Sternum. Longer than wide in ratio of 15 : 11. Otherwise essentially as in male.

Legs. 1243. Width of first patella at "knee" .242 mm., tibial index of first leg 6. Width of fourth patella at "knee" .187 mm., tibial index of fourth leg 9.

	Femora	Patellae	Tibiae	Metatarsi	Tarsi	Totals
	(All measurements in millimeters)					
1.	3.770	.780	3.510	3.640	.910	12.610
2.	2.470	.650	1.820	2.080	.660	7.680
3.	1.100	.430	.650	.910	.380	3.470
4.	2.405	.455	1.625	1.885	.575	6.945

Spines and hairs on legs as in male.

Abdomen. Conspicuously gibbous just in front of middle (Fig. 44); 3.9 mm. long; genital fold as shown in Figure 45.

Color in alcohol. Essentially as in male except that the abdomen is more conspicuously provided with the silvery flecks and has the dark lateral irregular spots much reduced; there is also a clear middorsal stripe with narrow lateral oblique lines extending ventrally as in so many species of this genus.

Type locality. Male holotype and female allotype from El Volcan, Chiriqui, R. P., August, 1950. Several paratypes of both sexes from El Volcan, August, 1950 and Boquete, Chiriqui, R. P., July, 1939 and 1954.

TETRAGNATHA GUATEMALENSIS O. P. Cambridge, 1889
(Figures 46-53)

T. guatemalensis F. P. Cambridge, 1903

T. guatemalensis Banks, 1909

T. guatemalensis Petrunkevitch, 1911

T. seneca Sealey, 1928

T. banksi Levi and Field, 1954

T. guatemalensis Roewer, 1942

T. guatemalensis Kraus, 1955

Male hypotype. Total length including chelicerae 13 mm.; exclusive of the chelicerae 8.10 mm. Carapace 2.925 mm. long; 1.95 mm. wide opposite second coxae where it is widest.

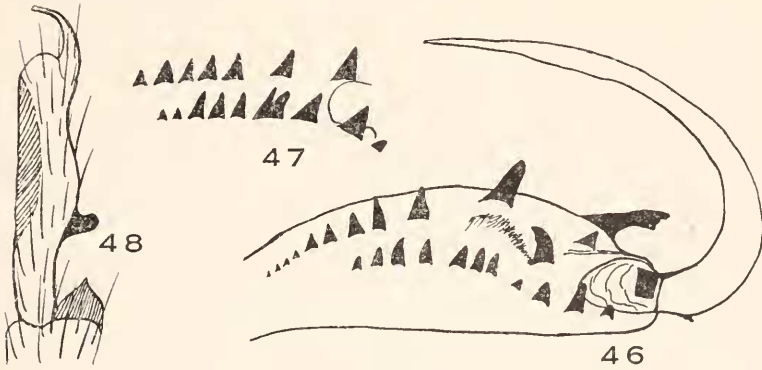
Eyes. Viewed from above, both rows recurved, anterior row rather strongly, posterior row moderately. Viewed from in front, anterior row moderately recurved, posterior row slightly procurved (Fig. 53), both measured by centers. Central ocular quadrangle wider behind than in front in ratio of 23 : 18; wider behind than long in ratio of 23 : 19. Ratio of eyes AME : ALE : PME : PLE = 6 : 4.5 : 5 : 5. AME separated from one another by their diameter, from ALE by about 2.33 times their diameter. PME separated from one another by twelve-fifths of their diameter, from PLE by 2.7 times their diameter. Laterals separated from one another by about the diameter of PLE. AME separated from PME by about 1.33 times the diameter of AME, hence further from one another than ALE are from PLE. Height of clypeus equal to 1.5 times the diameter of AME.

Chelicerae. Very divergent; basal segment slightly shorter than carapace. The following features appear to be particularly worthy of mention: there is a basal dorsal cusp on the fang but it appears to be variable in the degree to which it is developed in different individuals; the prolateral spur is robust and shows two tubercles below the apex; along the promargin of the fang groove there is a small tooth fairly close to the spur, a hook-like tooth behind that, then the "large tooth", and this is followed by a series of nine teeth with the last four being very minute (this is not in agreement with statement by F. P. Cambridge); the retromargin has three teeth near the apex, then a small tooth (not present on the right side), and this is followed by seven

teeth (Fig. 46). The spur, the three most apical promarginal teeth, and the three most apical retromarginal teeth appear to be fairly consistent in their appearance in different individuals but a considerable range of variation has been noted with respect to the remaining teeth.

Palp. Tibia longer than patella in ratio of 3 : 2; conductor geniculate at beginning of apical third, somewhat spoon-shape at apex; paracymbium terminates in a unique slender curved process (Figs. 49-51).

Female hypotype. Total length including chelicerae 10.40 mm. Abdomen considerably swollen in anterior half; genital fold as shown in Figure 52.



External Anatomy of *Tetragnatha*

Figures 46-48, *T. guatemalensis*

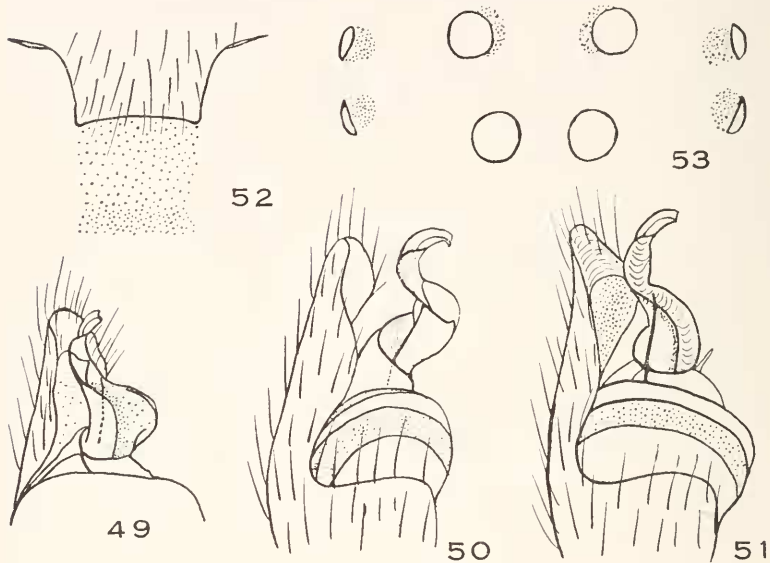
Figs. 46-47. Male chelicera and cheliceral teeth, and female cheliceral teeth, respectively.

Fig. 48. Male paracymbium.

Chelicerae. The fang has a dorsal basal cusp; the promargin of the fang groove has a large apical tooth, a somewhat smaller tooth considerably separated from the first, and then after a considerable space there is a series of five teeth diminishing in size toward the proximal end of the segment; the retromargin has a small apical tooth, a large tooth close to it followed by a series of eight teeth with the second and third of this series

coalescent (Fig. 47). A considerable variation in respect to number of teeth and their placement has been noted among different individuals.

Color in alcohol. The color is difficult to describe adequately. The carapace has a pair of broad dusky dorsal stripes reaching from the median pit to the posterior eyes; the lateral sides of



External Anatomy of *Tetragnatha*

Figures 49-53, *T. guatemalensis*

Figs. 49-51. Three views of distal end of male palpal tarsus; Fig. 49 drawn at a smaller scale.

Fig. 52. Genital fold of female.

Fig. 53. Eye group of male from in front.

the carapace are also dusky. The abdomen is covered by many small irregular whitish spots; laterally there are many narrow black irregular stripes alternating with narrow yellowish stripes; the venter has the usual dark median stripe with lighter spangled areas on each side.

Type locality. The male and female hypotypes are from Barro

Colorado Island, C. Z., August, 1954. Numerous specimens of both sexes from: Barro Colorado Island, June, July, 1934; July, 1936; June, 1939; June, 1950; August, 1954; Gamboa, C. Z., July, 1954.

TETRAGNATHA LABORIOSA Hentz 1850
(Figures 54-59)

- T. illinoisensis* Keyserling, 1879
T. alba, F. P. Cambridge, 1903
T. alba Banks, 1909
T. alba Petrunkevitch, 1911
T. laboriosa Petrunkevitch, 1911
T. laboriosa Seeley, 1928
T. alba Roewer, 1942
T. laboriosa Roewer, 1942
T. laboriosa Kraus, 1955

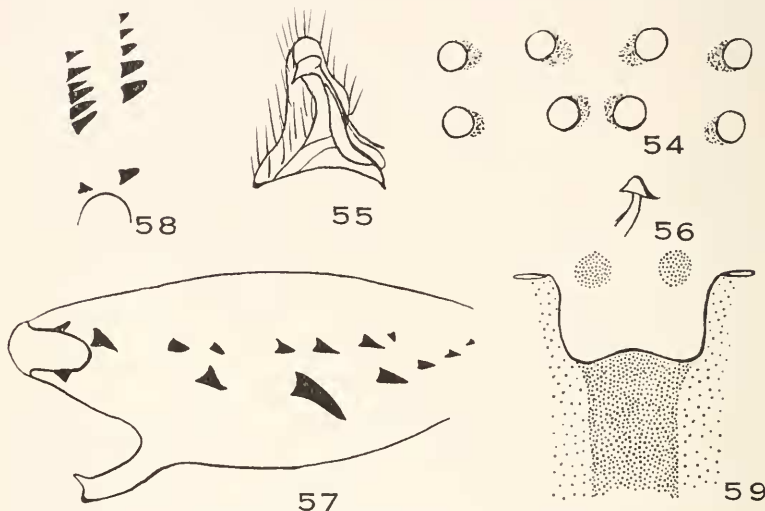
Notes from Dr. W. J. Gertsch suggested the synonymy given above. Comparisons of many specimens of both *T. laboriosa* and *T. alba* from different localities have convinced me that this is correct. Since the species has been described many times and is one of the best known in the genus only those features believed to be most distinctive will be emphasized here.

Distinctive features: Male. ALE and PLE about as far from one another as AME are from PME; palpal patella slightly shorter than palpal tibia; the conductor and embolus as shown in Figures 55-56; the paracymbium is not divided distally; the prolateral spur is robust and bifid distally; the "large tooth" is present on the promargin of the fang groove with other teeth as shown in Figure 57; the abdomen is conspicuously silvery with alternating dark and silvery stripes; of medium size, varying from 5 mm. to about 6.5 mm.

Female: size varies from about 6 mm. to about 8 mm. in length; the genital fold as shown in Figure 59; the cheliceral teeth as shown in Figure 58 with considerable variation noted among the many individuals examined; F. P. Cambridge noted a small dorsal basal cusp on the fang but I have not found this.

Collection records: Numerous specimens of both sexes from El Volcan, Chiriqui, R. P., February 28, 1936 (W. J. Gertsch), and August, 1950; Boquete, Chiriqui, R. P., August, 1954;

Chilibre, C. Z., July, 1950; apparently also from Barro Colorado Island, C. Z., June, 1934 and 1936; August, 1939; July, 1954.



External Anatomy of *Tetragnatha*

Figures 54-59, *T. laboriosa*

Fig. 54. Eye group of male from in front.

Fig. 55. Distal end of male tarsus.

Fig. 56. Distal end of male conductor, from a different view, to show distinctive apex.

Fig. 57. Male cheliceral teeth.

Fig. 58. Female cheliceral teeth.

Fig. 59. Genital fold of female.

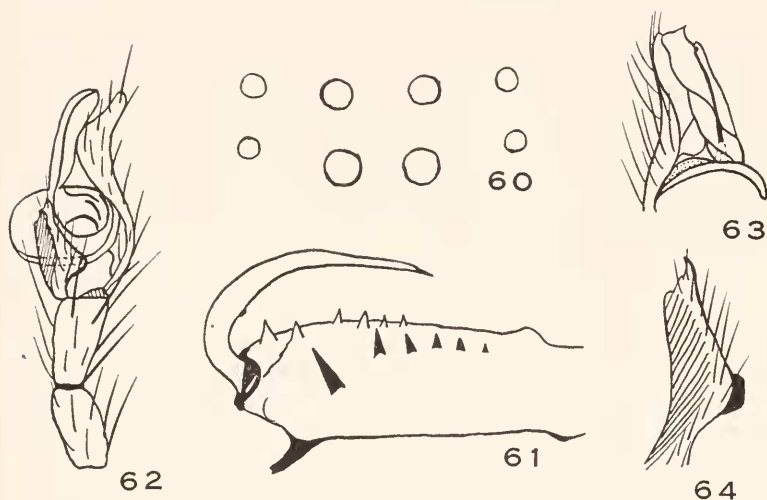
TETRAGNATHA MABELAE sp. nov.

(Figures 60-64)

Male holotype. Total length exclusive of the chelicerae 6.305 mm.; including the chelicerae 7.085 mm. Carapace 1.885 mm. long, 1.105 mm. wide opposite second coxae where it is widest; neither eye row occupies the full width of the carapace at its level.

Eyes. Eight in two rows as usual; viewed from above, anterior

row strongly and posterior row moderately recurved; viewed from in front, anterior row gently recurved, posterior row slightly recurved, all measured by centers. Central ocular quadrangle wider behind than in front in ratio of 28 : 25; wider behind than long in ratio of about 14 : 11. Ratio of eyes AME : ALE : PME : PLE = 4.5 : 2.5 : 3.75 : 3. AME separated from one another by ten-ninths of their diameter, from ALE by a little less than twice their diameter. PME separated from one another by a little less than twice their diameter, from PLE by nearly the same distance. Laterals separated from one an-



External Anatomy of *Tetragnatha*

Figures 60-64, *T. mabelae*

Fig. 60. Eye group of male from in front.

Fig. 61. Male chelicera and cheliceral teeth.

Fig. 62. Male palpal patella, tibia, and tarsus.

Fig. 63. Distal ends of cymbium, conductor, and embolus of male palp.

Fig. 64. Male paracymbium.

other by twice the diameter of ALE. AME separated from PME by a little more than their diameter (Fig. 60). Height of clypeus equal to five-fourths of the diameter of AME.

Chelicerae. Well developed; very divergent; basal segment 1.235 mm. long and, therefore, about two-thirds as long as carapace; with a moderately well developed prolateral spur terminating in a pair of minute lobules; fang moderately slender, slightly sinuous and with a small cusp on inner margin about one-fourth from base; promargin with the "large tooth" and five others diminishing in size toward the base of the segment; retromargin with six teeth as shown in Figure 61.

Maxillae. Essentially parallel; with normal concavities on outer margin toward the tip; longer than lip in ratio of 5 : 2; about four times as long as wide at narrowest place.

Lip. Broader at base than long in ratio of 4 : 3; sternal suture straight; sternal tubercles at ends of sternal suture pronounced.

Sternum. Moderately convex; generally scutiform; longer than wide in ratio of about 4 : 3; continued between fourth coxae which are separated by about one-fourth of their width.

Legs. 1243. Width of first patella at "knee" .252 mm., tibial index of first leg 4. Width of fourth patella at "knee" .187 mm., tibial index of fourth leg 5.

	Femora	Patellae	Tibiae	Metatarsi	Tarsi	Totals
	(All measurements in millimeters)					
1.	5.785	.945	5.687	5.840	1.430	19.687
2.	3.770	.780	3.120	3.250	.975	11.895
3.	2.080	.465	1.170	1.495	.650	5.860
4.	4.160	.650	3.120	3.025	.780	11.735
Palp	.975	.340	.375	—	.845	2.535

All legs with both hairs and spines.

Palp. The tibia is only slightly longer than the patella and both are short; the paracymbium is short, broad, and has a somewhat serrate distal margin; the embolus forms a normal loop on the bulb and then extends with the rather broad conductor to its termination close to the apex of the eymbium (Figs. 62-64).

Abdomen. Not continued posterior to spinnerets; extended only slightly over the carapace; only slightly notched dorsally at base; nearly uniform in width throughout; 4.355 mm. long; .780 mm. wide near base and, therefore, nearly six times as long as wide.

Color in alcohol. Legs, mouth parts, and sternum all with

varying shades of yellowish. Carapace yellowish with a dusky stripe extending from posterior border to the median pit and then continuing forward as a pair of somewhat diverging stripes. Abdomen: dorsally and dorsolaterally covered by many yellowish silvery spangles; ventrally there are fewer of the spangles with the median area free of these and somewhat transparent.

Type locality. Male holotype from Barro Colorado Island, C. Z., July, 1954. Two paratype males from Madden Dam Forest, C. Z., July, 1950. Females unknown.

TETRAGNATHA MEXICANA Keyserling, 1865
(Figures 65-70)

T. longa O. P. Cambridge, 1889

T. mexicana F. P. Cambridge, 1903

T. apheles Chamberlin and Ivie, 1936 (male only)

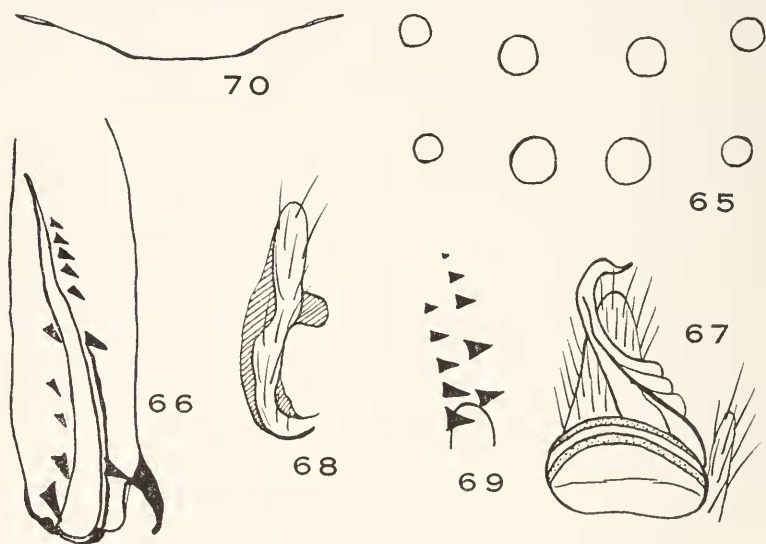
T. mexicana Roewer, 1942.

F. P. Cambridge had Keyserling's holotype female for study and regarded it as an immature specimen. He was certain that *T. longa* O. P. Cambridge was the same species and he had both sexes for study. The female reported by Banks (1929) is immature and its identification is uncertain. I have had specimens from the British Museum for comparison with mine and with those described by Chamberlin and Ivie as *T. apheles*. It is quite clear that the female of *T. apheles* is a recently moulted *T. antillana* Simon. The male appears to be a *T. mexicana* Keyserling and is so regarded here. There may be a single female in my collection which belongs to this species but I consider this uncertain. In view of the confusion relating to this species the decision has been made to give a rather complete description of a male hypotype in accord with my usual procedure.

Male hypotype. Total length including chelicerae 13.455 mm.; exclusive of the chelicerae 11.505 mm. long. Carapace 2.925 mm. long; 1.625 mm. wide opposite second coxae where it is widest; generally slender; with lateral ocular tubercles well separated; with cephalic region only slightly raised; median pit irregularly circular; with a rather marked transverse groove between AME and PME.

Eyes. Viewed from above, both rows rather strongly recurved; viewed from in front, anterior row gently recurved, posterior

row more strongly recurved, both measured by centers. Central ocular quadrangle wider behind than in front in ratio of 20 : 17; wider behind than long in ratio of 10 : 9. Ratio of eyes AME : ALE : PME : PLE = 5.5 : 3.75 : 4.25 : 4. AME separated from one another by about five-fourths of their diameter, from ALE by nearly 1.6 times their diameter. PME separated from one another by about 2.8 times their diameter, from PLE by nearly 2.25 times their diameter. Laterals separated from one



External Anatomy of *Tetragnatha*

Figures 65-70, *T. mexicana*

- Fig. 65. Eye group of male from in front.
 Fig. 66. Male chelicera and cheliceral teeth.
 Fig. 67. Distal end of male palpal tarsus.
 Fig. 68. Male paracymbium.
 Fig. 69. Female cheliceral teeth from a British Museum specimen.
 Fig. 70. Genital fold of female from a British Museum specimen.

another by 2.8 times the diameter of ALE. AME separated from PME by nearly 1.5 times the diameter of the former and, hence, closer to the latter than the laterals are to one another. Height of clypeus equal to a little more than twice the diameter

of AME. The relative distances between the different types of eyes as they are considered here appear to be somewhat different from those observed in specimens from the British Museum (Natural History). These differences, however, are not considered to be particularly significant.

Chelicerae. Divergent; moderately slender; basal segment 2.08 mm. long and, therefore, about two-thirds as long as carapace; prolateral spur a simple, slender hook, not bifid terminally; fang slender, somewhat sinuous; fang groove with seven promarginal teeth and five retromarginal teeth spaced essentially as shown in Figure 66. The two chelicerae do not agree in the number of teeth present along the fang groove. In the hypotype the teeth on the left are as shown in the figure while on the right there are only six promarginal teeth but there are seven retromarginal teeth. This again emphasizes the unreliability of teeth as a certain character for identification.

Maxillae. Essentially parallel but quite concave along outer margin at the beginning of the last third; considerably broadened at distal border.

Lip. Chitinized lip wider at base than long in ratio of 6 : 5; sternal suture gently procurved; with well-developed sternal tubercles at ends of sternal suture.

Sternum. Generally scutiform; longer than wide in ratio of 7 : 4; scalloped opposite all coxae and continued between all of these including the fourth which are separated by a little more than one-fifth of their width; moderately convex; covered by both relatively short and long bristles.

Legs. 1423. Width of first patella at "knee" .418 mm., tibial index of first leg 4. Width of fourth patella at "knee" .330 mm., tibial index of fourth leg 5.

	Femora	Patellae	Tibiae	Metatarsi	Tarsi	Totals
	(All measurements in millimeters)					
1.	9.945	1.300	10.595	10.725	2.145	34.710
2.	6.500	1.050	5.850	6.045	1.235	20.680
3.	3.185	.585	1.820	2.600	.845	9.035
4.	7.540	.780	6.400	5.785	1.235	21.740
Palp	1.650	.440	.660	—	.924	3.674

All legs with both spines and hairs.

Palp. The tibia is longer than the patella in ratio of 3 : 2;

the tibia has the usual chitinous rim at distal end; the paracymbium is long, rather slender, bluntly rounded at its distal end; the conductor shows three thin spiraloid plates near its middle and appears to be somewhat spiraloid at its distal end (Figs. 67-68). One specimen shows the distal end of the conductor almost exactly as drawn by F. P. Cambridge but the hypotype appears somewhat different. These differences are regarded as well within the normal variation of the species.

Abdomen. Long, slender; slightly the widest near base and gradually tapered to posterior end which is not extended beyond spinnerets; 8.385 mm. long; .975 mm. wide near base and, therefore, more than eight times as long as wide. Genital fold (Fig. 70) nearly transverse.

Color in alcohol. Legs yellowish with small grayish spots; femora one and two with an obscure prolateral grayish stripe. Chelicerae yellowish white with fang and teeth darker. Maxillae yellowish with grayish streaks. Lip yellowish with grayish markings on the strongly chitinized portions. Sternum with various shades of dusty gray. Abdomen: very light colored in general; dorsum with many irregular silvery spangles and a double series of small black dorsolateral spots; the venter has the usual median darker stripe.

Two females appear to go with the males but they are probably immature. The general characteristics of females have been studied from specimens loaned by the British Museum (Natural History). From these specimens Figures 69 and 70 have been drawn.

Type locality. The male hypotype is from Barro Colorado Island, C. Z., August, 1939. Three other males and probably two immature females are in the collection from the same locality, June and August, 1939.

TETRAGNATHA PALLESCENS F. P. Cambridge, 1903
(Figures 71-75)

T. pallida Banks, 1892

Eugnatha pallida Banks, 1898

T. pallescens F. P. Cambridge, 1903

T. bidens F. P. Cambridge, 1903

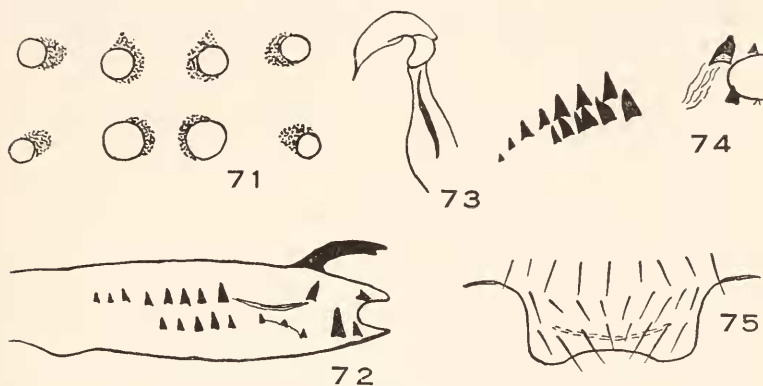
T. pallescens Seeley, 1928

T. pallescens Petrunkevitch, 1930

T. pallescens Bryant, 1940

T. pallescens Bryant, 1945

This species is well known and has been quite adequately described by several authors in fairly recent years (Seeley, 1928; Petrunkevitch, 1930; Kaston, 1948). For this reason only distinctive characteristics and a few figures will be given in this paper. Petrunkevitch (1930) was the first, so far as I know, to point out that *T. bidens* F. P. Cambridge was the same as *T. pallescens*.



External Anatomy of *Tetragnatha*

Figures 71-75, *T. pallescens*

Fig. 71. Eye group of male from in front.

Fig. 72. Male chelicera and cheliceral teeth.

Fig. 73. Distal end of male conductor to show distinctive apex.

Fig. 74. Female cheliceral teeth.

Fig. 75. Genital fold of female.

Distinctive features. Male: The lateral eyes are considerably farther from one another than AME are from PME (Fig. 71); the palpal patella is about three-fourths as long as the palpal tibia; the conductor is curiously sickle-shaped distally (Fig. 73); the paracymbium is long, slender, and rounded at the apex; the chelicerae are nearly as long as the carapace; the prolateral spur on the basal segment of the chelicera is unequally bifid; the "large tooth" is absent from the promargin of the fang

groove; the cheliceral teeth are essentially as shown in Figure 72; in some specimens the abdomen appears to be very slightly prolonged posterior to the spinnerets; spines of moderate length are on all legs.

Female. The slightly extended abdomen is somewhat more evident in this sex than in males; the abdomen is somewhat gibbous anteriorly and is notched dorsally at its base; the cheliceral teeth are essentially as shown in Figure 74; the genital fold is essentially as shown in Figure 75.

Collection records. Both sexes have been collected in the following localities: Barro Colorado Island, C. Z., June-July, 1934; February-March, 1936 (W. J. Gertsch); June, 1936; El Volcan, Chiriqui, R. P., February, 1936 (W. J. Gertsch).

TETRAGNATHA PALLIDA O. P. Cambridge, 1889
(Figures 76-80)

T. pallida F. P. Cambridge, 1903

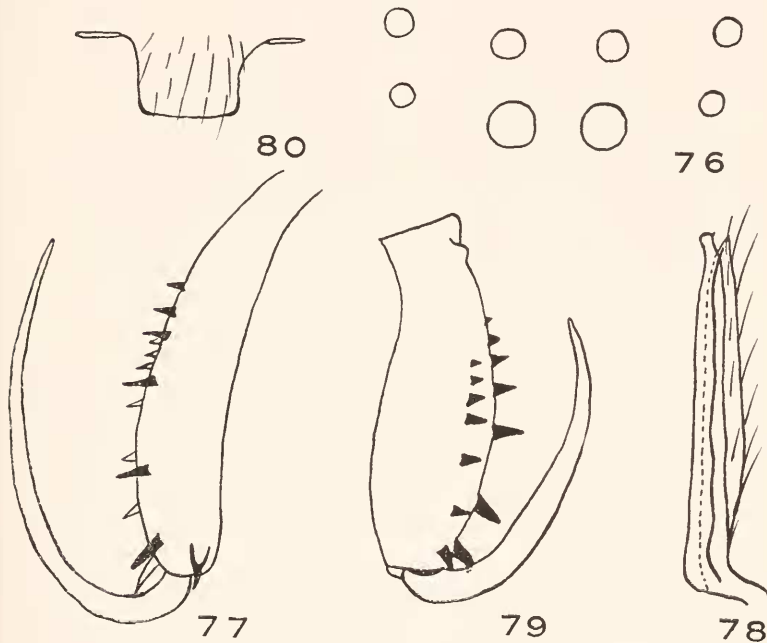
T. pallida Banks, 1929

T. pallida Roewer, 1942

This species was described from Bugaba, Panama, and has only been reported once since that time (Banks, 1929) so far as I know.

Male hypotype. Total length exclusive of the chelicerae 6.83 mm.; including the chelicerae length is 8.455 mm. Carapace 1.755 mm. long. The whole body is long and slender. The legs are long, slender, and bear stout spines and hairs. Ratio of eyes AME : ALE : PME : PLE = 10 : 4 : 5.5 : 5.5. AME separated from one another by their diameter, from ALE by a little more than 1.5 times their diameter. PME separated from one another by slightly more than twice their diameter, from PLE by a little less than three times their diameter. Laterals separated from one another by a little less than twice the diameter of PLE (Fig. 76). AME separated from PME about as far as ALE is separated from PLE. The central ocular quadrangle is nearly square, only slightly longer than wide. Chelicerae: basal segment 1.722 mm. long and, therefore, almost as long as the carapace; the fang has no cusps; the promargin of the fang groove has six teeth and the retromargin seven, all spaced essentially as shown in Figure 77; there is no true "large tooth" in the

usual sense; the prolateral spur is simple without distal bifurcation. Palp: the tibia is longer than patella in ratio of about 3 : 2; the bulb is relatively short and the cymbium, conductor, and embolus are all long and slender (Fig. 78). The color in both sexes is very pale throughout with many yellowish silvery spangles on the abdomen. A few of the females in the collection have bright red spots at the bases of the spines and a bright red narrow dorsolateral stripe on each side of the abdomen.



External Anatomy of *Tetragnatha*

Figures 76-80, *T. pallida*

- Fig. 76. Eye group of male from in front.
 Fig. 77. Male chelicera and cheliceral teeth.
 Fig. 78. Distal ends of male cymbium, conductor, and embolus.
 Fig. 79. Female chelicera and cheliceral teeth.
 Fig. 80. Genital fold of female.

Female hypotype. Total length exclusive of the chelicerae 10.01 mm.; including chelicerae 10.985 mm. Abdomen not extended posterior to spinnerets. The genital fold is shown in Figure 80. The chelicerae are relatively short and robust with seven teeth on each margin of the fang groove as shown in Figure 79.

Type locality. Male and female hypotypes from Canal Zone Forest Reserve, July, 1934. Other specimens of both sexes from Barro Colorado Island, C. Z., June-July, 1934; June-July, 1936; June-August, 1950; July-August, 1954.

TETRAGNATHA SINUOSA sp. nov.

(Figures 81-86)

Male holotype. Total length exclusive of chelicerae 4.095 mm.; including chelicerae 4.355 mm. Carapace 1.27 mm. long, .877 mm. wide opposite intervals between second and third coxae where it is widest; anterior row of eyes occupy the full width of carapace at their level.

Eyes. Eight in two rows as usual; ocular tubercles only moderately prominent; viewed from above, both rows recurved, anterior row strongly so and posterior row moderately; viewed from in front, anterior row gently recurved, posterior row gently procurved, all measured by centers; central ocular quadrangle wider behind than in front in ratio of 14 : 11, wider behind than long in ratio of 14 : 12. Ratio of eyes AME : ALE : PME : PLE = 4 : 2.75 : 4 : 3. AME separated from one another and from ALE by nearly five-fourths of their diameter. PME separated from one another by a little more than five-fourths of their diameter, from PLE by about the same distance. Laterals separated from one another by the diameter of PLE. AME separated from PME by slightly more than their diameter, hence (Fig. 81) somewhat farther apart than laterals are separated from one another.

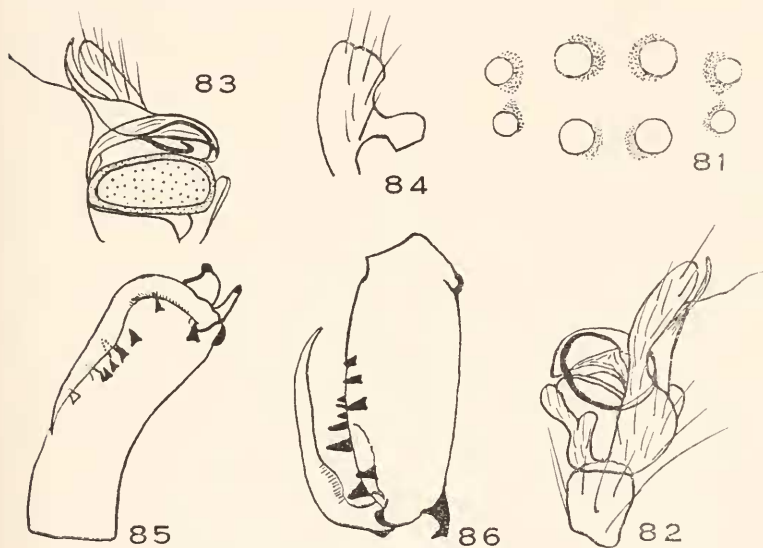
Chelicerae. Short, robust, only slightly porrect and divergent; the fang is strongly sinuous and has a low cusp on the inner surface and a low tubercle at its base on the dorsal side; the pro-lateral spur has moved into a nearly dorsal position; the pro-margin of the fang groove has five teeth with the first a massive growth not seen in any other species; the retromargin has seven

teeth (Figs. 85-86). There is no "large tooth" in the usual sense.

Marillac. Nearly parallel with much less concavity along lateral borders than usual in the genus; longer than lip in ratio of 9 : 4; not quite three times as long as wide in the middle.

Lip. Wider at base than long in ratio of about 3 : 2; sternal suture gently procurved; sternal tubercles at ends of sternal suture shorter and blunter than usual in the genus.

Sternum. Rather strongly convex; generally scutiform; longer than wide in ratio of 7 : 5; less strongly scalloped opposite each coxa than usual in the genus; continued between fourth coxae which are separated by one-third of their width.



External Anatomy of *Tetragnatha*

Figures 81-86, *T. sinuosa*

Fig. 81. Eye group of male holotype from in front.

Fig. 82. Male palp; tibia and tarsus.

Fig. 83. Male palpal tarsus; a different view.

Fig. 84. Paraacymbium of male.

Fig. 85. Male chelicera and cheliceral teeth from below.

Fig. 86. Male chelicera and cheliceral teeth; prolateral view (from a paratype).

Legs. 1423. Width of first patella at "knee" .176 mm., tibial index of first leg 4. Width of fourth patella at "knee" .132 mm., tibial index of fourth leg 7.

	Femora	Patellae	Tibiae	Metatarsi	Tarsi	Totals
	(All measurements in millimeters)					
1.	3.835	.585	3.770	3.640	1.040	12.870
2.	2.340	.520	1.950	2.080	.780	7.670
3.	1.210	.264	.704	.836	.445	3.459
4.	3.770	.330	1.650	1.950	.650	8.350
Palp	.694	.198	.210	—	.638	1.740

All legs with both spines and hair.

Palp. The tibia is slightly longer than the patella and is very broad; both tibia and patella are short; both cymbium and paracymbium appear to be somewhat distinctively shaped (Figs. 82-84); the embolus and conductor appear to be completely separated much of their lengths, the former with a conspicuous loop at the distal end of the bulb and terminating in a long lash-like apex (Figs. 82-83).

Abdomen. Not continued posterior to spinnerets; long, slender and nearly uniform in width; 3.90 mm. long, .715 mm. wide about one-third from base; not notched dorsally at base.

Color in alcohol. Generally a light yellowish throughout; the earpace is dusky gray in the cephalic portion, behind the median thoracic pit and along the lateral margins. Abdomen: the usual characteristic silvery spangles are few in number in the mid-dorsal region but are concentrated more or less as a dorsolateral stripe on each side; there is also a row of five or six darker spots above the dorsolateral silvery stripes on each side and a small median blackish spot just above the anal tubercle; the venter is almost uniformly yellowish with few yellowish silvery spangles.

Type locality. Male holotype from Summit, C. Z., August, 1950. Four male paratypes from the same locality, August, 1950, and a single male from the C. Z. Forest Reserve, July, 1954 complete the known list of specimens. The female is unknown.

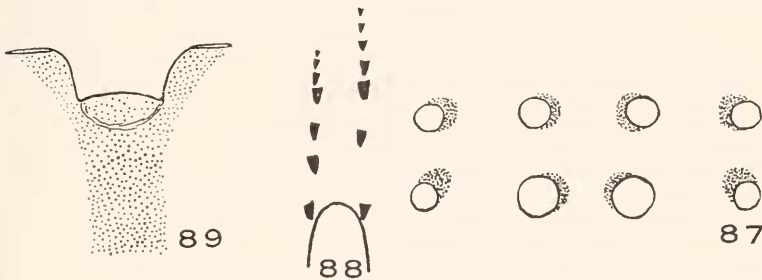
TETRAGNATHA TENUIS O. P. Cambridge, 1889
(Figures 87-89)

T. tenuis F. P. Cambridge, 1903

T. tenuis Roewer, 1942

This seems to be a rare species in collections. The Cambridges had it from Guatemala and Panama. The British Museum (Natural History) was unable to loan me specimens and this indicated, I suppose, that only the original types are in that institution. There is one female in the M. C. Z. collection from San Domingo (Dominican Republic) doubtfully assigned to this species. As I have already pointed out, females are often difficult to identify with certainty but I seem to have a few specimens which must be assigned to this species.

Female hypotype. Total length including chelicerae 10.985 mm.; exclusive of chelicerae 9.75 mm. Carapace 2.73 mm. long, 1.625 mm. wide opposite second coxae where it is widest. The



External Anatomy of *Tetragnatha*

Figures 87-89, *T. tenuis*

Fig. 87. Eye group of female from in front.

Fig. 88. Cheliceral teeth of female.

Fig. 89. Genital fold of female.

whole body is long and slender with the abdomen only slightly swollen at base. Legs long and slender with both hairs and spines. Ratio of eyes AME : ALE : PME : PLE = 5 : 3.25 : 4.25 : 4. AME separated from one another by 1.3 times their diameter, from ALE by twice their diameter. PME separated from one another by about 2.33 times their diameter, from PLE by about 2.1 times their diameter. Laterals separated from one another by slightly less than twice the diameter of ALE. AME separated from PME by 1.2 times their diameter, hence about as far apart as ALE are from PLE (Fig. 87). Height of clypeus equal to 1.6 times the diameter of AME. The central ocular quadrangle is wider behind than in front in ratio of 17 : 14, wider behind

than long in ratio of 17 : 15. Chelicerae: robust, moderately porrect, slightly divergent; basal segment 1.55 mm. long and, therefore, only a little more than one-half as long as the carapace; fang without cusps; promargin of fang groove with seven teeth; retromargin with eight on right and seven on left (Fig. 88); teeth observed here not quite in agreement with statements made by F. P. Cambridge. Color: legs and mouth parts, except lip, with varying shades of yellowish; lip reddish brown; sternum yellowish; the carapace has a few dusky streaks behind the thoracic pit and in front of it there are two faint diverging dusky stripes passing toward the posterior eyes; on the abdomen dorsally and laterally there are many light yellowish silvery spangles surrounded by light semitransparent reticulations; the spangles diminish toward the venter and disappear medially leaving a rather narrow yellowish stripe throughout. The genital fold is shown in Figure 89.

Type locality. The female hypotype is from Barro Colorado Island, C. Z., Sept. 1939. Several other females are in my collection from the same locality, June, 1936; June and August, 1939.

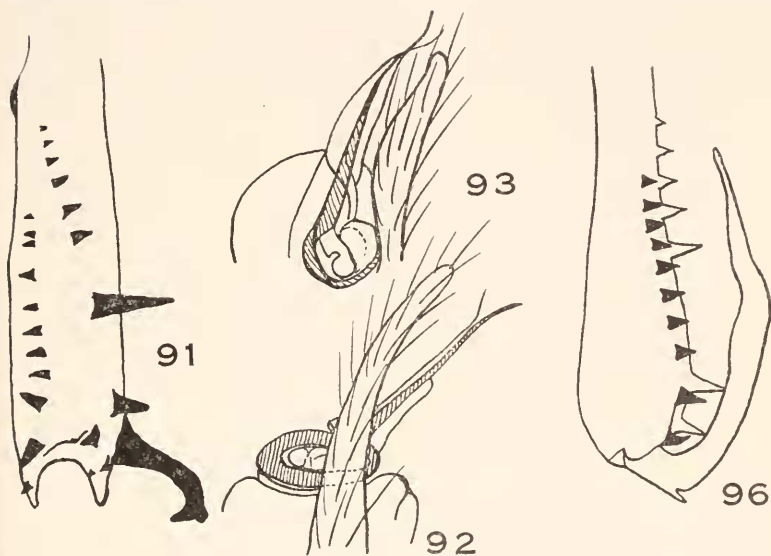
TETRAGNATHA TENUISSIMA O. P. Cambridge, 1889
(Figures 90-96)

- T. tenuissima* F. P. Cambridge, 1903
- T. tenuissima* Petrunkevitch, 1925
- T. tenuissima* Banks, 1929
- T. tenuissima* Petrunkevitch, 1930
- T. ethodon* Chamberlin and Ivie, 1936 (Females only)
- T. tenuissima* Bryant, 1940
- T. tenuissima* Roewer, 1942
- T. tenuissima* Bryant, 1945

This species is now known to be widely distributed throughout Mexico, Central America, northern part of South America, and most of the Caribbean islands. Petrunkevitch (1930) described the most important features of the females. The most essential characters of both sexes will be summarized here. The species occurs in my collections most frequently of all species known from Panama.

Male hypotype. Total length including chelicerae 8.45 mm.; excluding chelicerae 7.455 mm. Carapace 2.265 mm. long, 1.04

mm. wide opposite second coxae where it is widest. Very slender throughout whole body. Head rather sharply set off from thoracic part and with nearly parallel lateral borders. Viewed from above, both rows of eyes recurved, first row strongly so; viewed from in front, anterior row moderately recurved, posterior row slightly recurved. Ratio of eyes AME : ALE : PME : PLE = 5 : 3 : 4.5 : 4. AME separated from one another by a little less than their diameter, from ALE by 1.3 times their



External Anatomy of *Tetragnatha*

Figures 91-93, 96, *T. tenuissima*

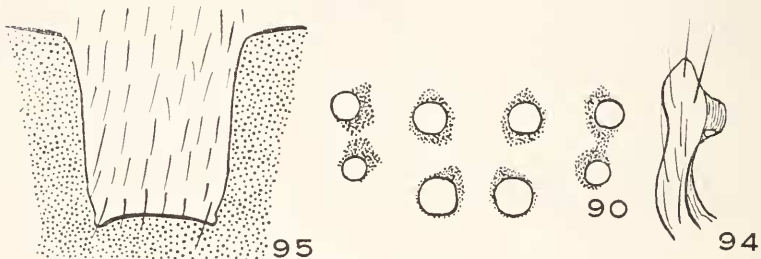
Fig. 91 Chelicera and cheliceral teeth of male.

Figs. 92-93. Two different views of distal end of male palpal tarsus.

Fig. 96 Chelicera and cheliceral teeth of female.

diameter. PME separated from one another by a little less than twice their diameter, from PLE by about the same distance. Lateral eyes separated from one another by the diameter of PLE. AME separated from PME by a little more than the diameter of the former and, hence, farther from one another than ALE are from PLE. The central ocular quadrangle is wider

behind than in front in ratio of about 8 : 7, slightly wider behind than long. Chelicerae: very porrect and divergent; generally long and slender; basal segment 2.21 mm. long and, therefore, almost as long as the carapace; the fang is moderately sinuous, long and slender and has no cusps; the prolateral spur is long, curved, with a very small dorsal apical tubercle and a robust ventral apical tubercle; the promargin of the fang groove has eleven teeth including the "large tooth" but the last is minute and easily overlooked; the retromargin has eleven teeth the first of which is also very small and easily overlooked (teeth as seen in the hypotype differ from those shown by F. P. Cambridge but these differences are well within the normal range of



External Anatomy of *Tetragnatha*

Figures 90, 94-95, *T. tenuissima*

Fig. 90. Eye group of male from in front.

Fig. 94. Male paracymbium.

Fig. 95. Genital fold of female.

variation). Palp: the tibia is a little shorter than the patella; the paracymbium is short, bluntly pointed at its apex and has a chitinized knob near the distal end; the conductor and embolus are finely attenuated at their tips (Figs. 92-94). One of the most distinctive features in this species is the complete absence of spines from the legs. The hair is coarse, however, and there are many bristles.

Female hypotype. Total length including chelicerae 10.725 mm.; exclusive of the chelicerae 8.775 mm. Abdomen not extended posterior to spinnerets. Also long and slender like the male but somewhat gibbous in anterior fifth of the abdomen. The

genital fold appears essentially as shown in Figure 95. Chelicerae: There is a very conspicuous basal dorsal cusp on the fang; the fang has a deep indentation on the inner side near the middle and is moderately sinuous; the promargin of the fang groove has seven teeth and the retromargin has eleven spaced essentially as shown in Figure 96 (a considerable variation in the teeth in different individuals has been noted); the basal segment is not quite as long as the carapace.

Type locality. The male hypotype is from Barro Colorado Island, C. Z., July, 1954 and the female is from the same locality, August, 1954. Many specimens of both sexes are in my collection from: Barro Colorado Island, C. Z., June-July, 1934; June-July, 1936; June-August, 1939; June-August, 1950; July-August, 1954; El Valle, R. P., July, 1936; Madden Dam, C. Z., August, 1939; C. Z. Experiment Gardens, July, July-August, 1950 and 1954; Boquete, Chiriqui, R. P., August, 1950 and 1954.

TETRAGNATHA TROPICA O. P. Cambridge, 1889
(Figures 97-102)

T. tropica F. P. Cambridge, 1903

T. tropica Banks, 1909

T. tropica Petrunkevitch, 1911

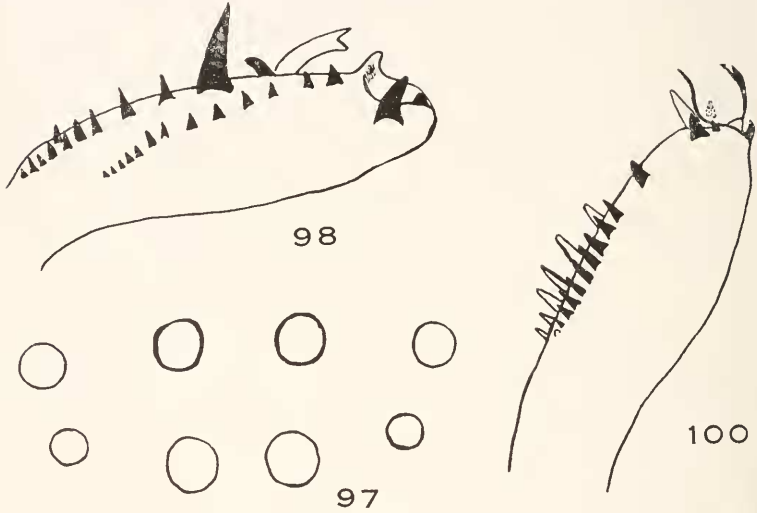
T. siduo Chamberlin and Ivie, 1936

T. amplidens Chamberlin and Ivie, 1936

T. tropica Roewer, 1942

Male hypotype. Total length including chelicerae 10.92 mm.; exclusive of the chelicerae 8.775 mm. Carapace 3.055 mm. long, 1.755 mm. wide opposite second coxae where it is widest. First row of eyes project slightly beyond the sides of the carapace; the second row occupies nearly the full width of the carapace at their level. Viewed from above, both rows of eyes recurved, posterior row slightly, anterior row moderately. Viewed from in front, anterior row moderately recurved, posterior row moderately procurved, both measured by centers (Fig. 97). Ratio of eyes AME : ALE : PME : PLE = 13 : 9 : 11 : 10. AME separated from one another by about their diameter, from ALE by about 1.5 times their diameter. PME separated from one another by nearly twice their diameter, from PLE by twice their diameter. Laterals separated from one another by slightly more

than the diameter of PLE. AME separated from PME by about 1.3 times their diameter, hence they are farther from one another than the laterals are from each other. The central ocular quadrangle is wider behind than in front in ratio of about 21 : 19, almost exactly as long as wide behind. Chelicerae: moderately porrect; strongly divergent; generally long and moderately slender; basal segment 2.86 mm. long and, therefore, only slightly



External Anatomy of *Tetragnatha*

Figures 97-98, 100, *T. tropica*

- Fig. 97. Eye group of male from in front.
 Fig. 98. Cheliceral teeth of male from below.
 Fig. 100. Cheliceral teeth of female from below.

shorter than the carapace; the fang is slightly sinuous and has a low tubercle on the inner surface about one third of its length from the base; the prolateral spur is moderately robust and distinctly bifid apically; the promargin of the fang groove has the "large tooth" with two small teeth distal to it and a series of ten small teeth proximal to it; the retromargin has a series of fifteen teeth shaped and spaced essentially as shown in Figure 98. The last five or six teeth along the fang groove are irregular

and, apparently, quite variable among the numerous specimens available for study.

Palp. The tibia is almost twice as long as the patella; the paracymbium is bluntly pointed distally; the distal end of the conductor is subaculeate and slightly hooked (Fig. 99).

The legs have both spines and hairs some of which are quite erect.

Female hypotype. Total length exclusive of the chelicerae 10.53 mm.; inclusive of the chelicerae 13.13 mm. Abdomen not extended posterior to the spinnerets; conspicuously gibbous in anterior third and concave along dorsal surface. The genital fold is essentially as shown in Figure 102. Chelicerae: there is a dorsal basal cusp on the fang; there is also an unusual dorsal distal tooth on the basal segment of the chelicera at the base of the fang; the promargin of the fang groove has a small and a much larger tooth at the distal end and, after a considerable space, a series of seven teeth; the retromargin has a total of thirteen teeth spaced essentially as shown in Figures 100-101. The exact number of cheliceral teeth seems to be quite variable among the numerous specimens available for study. I regard Chamberlin and Ivie's *T. amplidens* as one of these with a larger number of teeth than heretofore recognized in this species. Basal segment of the chelicerae not quite as long as the carapace.

Type locality. Both hypotypes are from Barro Colorado Island, C. Z., June, 1939. Numerous specimens of both sexes are in my collection from the following localities: Barro Colorado Island, C. Z., June-July, 1934; June, 1936; June-August, 1939; June-August, 1950; July, 1954; Madden Dam Forest, C. Z., July, 1950.

TETRAGNATHA VERMIFORMIS Emerton, 1884
(Figures 103-108)

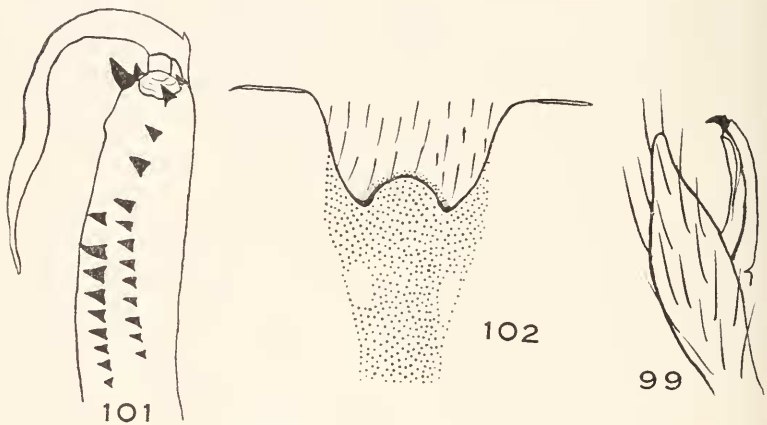
Eucta vermiformis Petrunkevitch, 1911

T. vermiformis Seeley, 1928

T. vermiformis Roewer, 1942.

The specimens now definitely assigned to this species have for some time been considered to represent a new and undescribed species. I have now carefully examined specimens from several parts of the United States and, together with the types in the

Museum of Comparative Zoology, compared them with my specimens from Panama. This study has convinced me that I have been dealing with the same species. There are what I consider minor differences in the cheliceral dentition, possibly the eyes and other features but I think these are all well within the normal range of variations of a widely dispersed species. It seems interesting to find this species so far south in Central America when it has previously been reported only from east of the Rocky Mountains in the United States and not yet from the West Indies.



External Anatomy of *Tetragnatha*

Figures 99, 101-102, *T. tropica*

Fig. 99. Distal ends of cymbium, embolus, and conductor of male.

Fig. 101. Cheliceral teeth of a second female from below.

Fig. 102. Genital fold of female.

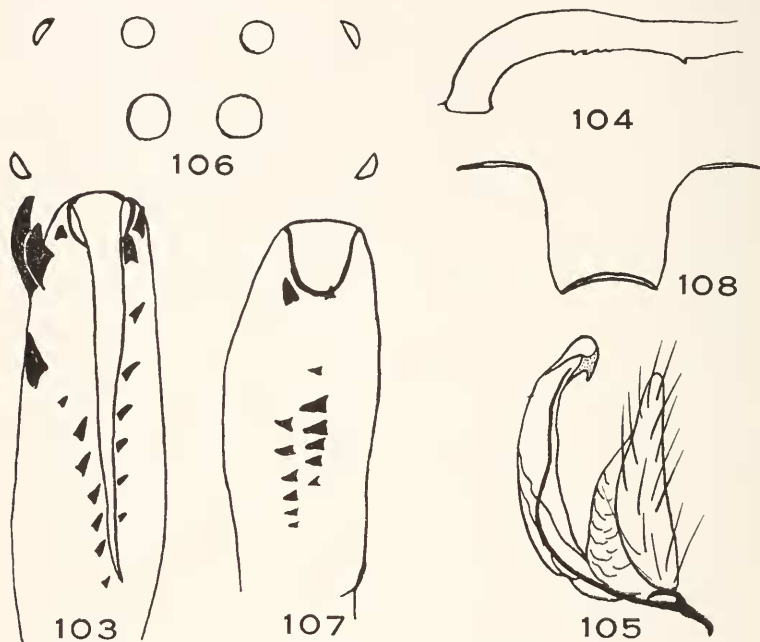
Male hypotype. Total length including the chelicerae 9.205 mm.; exclusive of the chelicerae 7.67 mm. Carapace 2.86 mm. long, 1.755 mm. wide; with anterior row of eyes occupying the full width of the carapace; with posterior row considerably shorter. Legs with both spines and hairs. Ocular tubercle bearing ALE quite prominent. Viewed from above, anterior row of eyes gently recurved, posterior row strongly recurved; viewed from in front, anterior row definitely procurved, posterior row

straight or slightly recurved. Ratio of eyes AME : ALE : PME : PLE = 5.5 : 3 : 3.5 : 3.5. AME separated from one another by about their diameter, from ALE by slightly more than twice their diameter. PME separated from one another by nearly three times their diameter, from PLE by a little more than twice their diameter. Laterals separated from one another by nearly five times the diameter of ALE. AME separated from PME by nearly twice the diameter of PME, hence much closer to one another than ALE are to PLE. The central ocular quadrangle is wider behind than in front in ratio of 17 : 15, wider behind than long in nearly the same ratio. Height of clypeus equal to twice the diameter of AME. Chelicerae: basal segment 2.47 mm. long and, therefore, about six-sevenths as long as the carapace; the fang has an inner cusp and a series of fine serrations nearer the base (Figs. 103-104); the promargin of the fang groove has ten teeth the third of which would probably be called the "large tooth" by F. P. Cambridge; the prolatral spur is slender and not apically bifid; the retromargin of the fang groove has eight teeth. Palp: the tibia, including the chitinous extension, is only slightly longer than the patella; the embolus extends in a very loose spiral through the somewhat twisted conductor to terminate in a characteristic apical form (Fig. 105); the paracymbium is broad at the base where it is strongly chitinized but it is very slender in the distal half and not notched at its apex. Color: legs, cephalothorax, and mouth parts are all yellowish; the abdomen is covered by many yellowish silvery spangles and grayish reticulations; the cardiac area has a transparent stripe; the venter is also covered by the yellowish silvery spangles and is without a median stripe which is so frequently present in the genus.

Female hypotype. Total length including the chelicerae 12.675 mm.; exclusive of the chelicerae 10.725 mm. Carapace 2.925 mm. long. Eyes essentially as in male (Fig. 106). Chelicerae: basal segment 1.95 mm. long, about two-thirds as long as carapace; the fang has no cusps; the promargin of the fang groove has seven teeth, the first of which is relatively large; the retromargin also has seven teeth, the first of which is small (Fig. 107); the cheliceral teeth are not in close agreement with description given by Seeley (1928). The genital fold is essentially as shown in

Figure 108. Abdomen: somewhat swollen at base but uniformly tapered to a blunt point at posterior end; about 4.5 times as long as wide near base; slightly extended posterior to spinnerets.

Type locality. The male hypotype and one other male are from Barro Colorado Island, C. Z., June, 1936; the female hypotype is from the same locality, August, 1939. Four females have been assigned to this species from El Volcan, Chiriqui, R. P., February, 1936 (Gertsch).



External Anatomy of *Tetragnatha*

Figures 103-108, *T. vermiformis*

Fig. 103. Male chelicera and cheliceral teeth.

Fig. 104. Lateral view of fang from male.

Fig. 105. Distal ends of cymbium, embolus, and conductor in male.

Fig. 106. Eye group of female from in front.

Fig. 107. Female cheliceral teeth.

Fig. 108. Genital fold in female.

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